



COMMERCIAL FISHERIES ABSTRACTS

U.S. DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES





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0.33 REACTION OF MALONALDEHYDE WITH PROTEIN

Crawford, David L. (Department of Food Science and Technology, Seafoods Laboratory, Astoria, Oregon 97103), T. C. Yu, and Russell O. Sinnhuber (Department of Food Science and Technology, Oregon State University, Corvallis 97331) Journal of Food Science 32, No. 3, 332-335 (May-June 1967)

The three-carbon dialdehyde, malonaldehyde, is one of the numerous carbonyl compounds associated with the oxidative deterioration of food lipids. Malonaldehyde combines with bovine serum albumin to form a stable complex. The formation of such a complex proceeds according to first-order reaction kinetics with an optimum rate of between pH 3 and 5 at 30° C. The complex formation is believed to involve the free amino groups of the protein. Malonaldehyde reacts with glycine under aqueous acidic conditions via an SN^2 mechanism to form the enamine, N-prop-2-enal amino acetic acid. The interaction of malonaldehyde derived from its enolic sodium salt, sodium 8-oxoacrolein, and from autoxidized lipid with the nucleophilic groups on protein was investigated.

The overall reaction of malonaldehyde with bovine plasma albumin followed first-order kinetics. The reaction rate was dependent upon the hydrogen ion concentration, and the maximum reaction rate was seen near pH 4.30. The decrease in free ϵ -amino lysine and N-terminal amino aspartic acid, which were available on bovine plasma albumin for reaction with 1-fluoro-2,4-dinitrobenzene (FDNB), showed that these nucleophilic functions on the protein were involved in the

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ABSTRACTER: M. F. Tripple

0.38 (*)

HISTOCHEMICAL STUDY ON THE LOCALIZATION AND PHYSIOLOGICAL SIGNIFICANCE OF GLUCOSE-6-PHOSPHATE DEHYDROGENASE SYSTEM IN THE OYSTER DURING THE STAGES OF SEXUAL MATURATION

Mori, Katsuyoshi (Department of Fisheries, Faculty of Agriculture, Tohoku University, Sendai, Japan) Tohoku Journal of Agricultural Research 17, No. 4, 287-295 (March 1967)

Japanese oysters, *Crassostrea gigas*, were cultured for 2 years in Matsushima Bay, Japan. Histochemical examination was used to show the presence of glucose-6-phosphate dehydrogenase in the oysters. The activities of this enzyme and the succinate and malate dehydrogenases of the tricarboxylic acid (TCA) cycle of Krebs were compared with parallel histochemical sections. The activity of glucose-6-phosphate dehydrogenase in maturing oysters was seen in the epithelia of the nephridium, digestive diverticulum, and intestine; the activity was also found in the visceral ganglion, cerebrovisceral connective tissue, genital canal, and gonoduct. The activity was not detectable in the connective tissue around the nephridium, adductor muscle, glycogen-bearing connective tissue, egg, or sperm. The results suggested that the oxidative mechanism of the pentose phosphate pathway for metabolism of carbohydrate does exist in the oyster.

The distribution of the glucose-6-phosphate dehydrogenase system was far more restrictive than the distribution of the TCA cycle enzymes. The intensity of the dehydrogenase declined after spawning as witnessed by the enzyme reaction

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ABSTRACTER: M. F. Tripple

REACTION OF MALONALDEHYDE WITH PROTEIN

GLUCOSE-6-PHOSPHATE DEHYDROGENASE IN THE OYSTER

0.38 (*) INFLUENCE OF WATER BINDERS ON THE ACTIVITY AND THERMAL INACTIVATION OF LIPASE

Guardia, Enrique J., and Gerhard J. Haas (Corporate Research Department, Technical Center, General Foods Corporation, Tarryton, New York) Journal of Agricultural and Food Chemistry 15, No. 3, 412-416 (May-June 1967)

The effect of water activity on lipase action has been investigated in such foods as oatmeal (Hutchinson et al., 1952), wheat flour (Cuendet et al., 1954), and fish muscle (Lovern, 1962). Lovern suggested that the increase in free fatty acids in frozen fish muscle stored at -30° C. was due to the action of endogenous enzymes. Sussman and Chin (1966) found that the liquid water in fish muscle was less than 10 percent by weight. Sharp (1953) suggested that the increase in fat acidity during the storage of dried beef having a moisture content of 3.2 percent was due to lipase activity.

These investigations, which were all conducted on dry systems, suggest that lipase is capable of activity at very low levels of moisture and relative humidity. Using liquid emulsion model systems, the present authors undertook to determine the effect of water concentration and water binders on the lipase activity of hog pancreas. For comparison, they also studied the activity of wheat germ lipase, olive-oil lipase, and a fungal lipase. Sucrose, propylene glycol, and glycerol were the water binders.

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ABSTRACTER: L. Baldwin

0.39 (*)

BINDING OF FATTY ACIDS BY PROTEINS

Bull, Henry B., and Keith Breese (Biochemistry Department, University of Iowa, Iowa City 52240) Archives of Biochemistry and Biophysics 120, No. 2, 303-308 (May 1967)

Considerable literature exists on the titration of proteins by strong acids and on the various factors influencing the titration behavior of proteins. Studies have been made on the titration of egg albumin and wool protein by a number of different acids. Apparently, the nature of the anion is important, and the affinity of the protein for acid greatly increases with increasing molecular weight. The important role of the anion indicates that the anions were being bound by the proteins and the un-ionized acid. It was of interest to examine the titrations of proteins by the homologous series of normal short-chain aliphatic acids. Because of the complexities introduced by the limited extent of ionization of these acids, a modification of the conventional technique of protein titration had to be found, and so equilibrium dialysis was used.

Egg albumin was titrated with acetic, propionic, n-butyric, i-butyric, n-valeric, n-caproic, and n-heptanoic acids. The method of equilibrium dialysis was used to titrate the proteins. The binding of protein at a given acid concentration was the same for all the acids at low concentration of the acids. After a critical acid concentration that was dependent upon the molecular weight of the acid was reached, the extent of binding increased geometrically as the length of

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ABSTRACTER: M. F. Tripple

EFFECT OF WATER BINDERS ON LIPASE ACTIVITY

PROTEIN BINDING OF FATTY ACIDS

2.02
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IV - ACID-SOLUBLE NUCLEOTIDES IN MUSCLE
OF MARINE INVERTEBRATES. DEGRADATION OF ADENYLIC ACID
IN THE MUSCLE OF SQUID

Arai, Ken-ichi
Bulletin of the Faculty of Fisheries Hokkaido University 17, No. 2, 83-90 (August 1966)

Ion-exchange chromatographic analysis was used to study the rates of degradation of adenosine 5'-monophosphate (AMP), inosine 5'-monophosphate (IMP), adenosine (AdR), and inosine (HxR) added with crude enzyme to the muscle extract of squid. When these substrates were incubated at 37° C., the following conversions were made: 7.60 μ mole of AMP changed to hypoxanthine (Hx) in 6 hr.; 6.02 μ mole of AdR changed to Hx in 1 min.; 1.48 μ mole of HxR changed to Hx in 5 min. These results suggested that strong activity of adenosine deaminase occurred. When 5'-nucleotidase with crude enzyme was added, the rate of degradation of AMP and production of Hx were accelerated. The authors believe that the dephosphorylation of AMP was the limiting step of the decomposition pathway of AMP. The effect of Cu^{++} , Hg^{++} , and F^{-} on the rates of degradation of AMP, IMP, AdR, and HxR was studied. As a result of the degradation of HxR in the dialyzed crude enzyme, the author presumed that the nucleoside hydrolase was present. In conclusion, the pathway of degradation of ATP in the muscle of squid may be as follows:
Adenosine 5'-triphosphate (ATP)-adenosine 5'-diphosphate (ADP)-AMP-AdR-HxR-Hx. [15 references]

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ABSTRACTER: M. M. Gwin

2.02
(*)
V - ACID-SOLUBLE NUCLEOTIDES IN MUSCLE
OF MARINE INVERTEBRATES. DEGRADATION OF ADENYLIC ACID
IN THE MUSCLES OF SCALLOP AND ABALONE

Arai, Ken-ichi
Bulletin of the Faculty of Fisheries Hokkaido University 17, No. 2, 91-98 (August 1966)

The rates of degradation of adenosine 5'-monophosphate (AMP), inosine 5'-monophosphate (IMP), adenosine (AdR), and inosine (HxR) added with crude enzyme to the muscle extract of scallop and abalone were studied by ion-exchange chromatography. When the substrates were incubated at 37° C., the following conversions occurred in scallop: 4.50 μ mole of AdR changed to HxR in 3 min. at pH 9.7; 3.03 μ mole of HxR changed to hypoxanthine (Hx) in 5 hr. at pH 7.4; and no changes in AMP were observed. The activity of adenosine deaminase was readily observed. The following conversions were seen in abalone incubated at 37° C.: 1.86 μ mole of AdR changed to adenine (Ad) in 3 hr.; 1.91 μ mole of HxR changed to Hx in 3 hr.; and no changes were observed in AMP and IMP. The enzymatic activity that accelerates the splitting of ribose from nucleoside was barely observed. No activity of adenosine deaminase was seen. When 5'-nucleotidase was added with crude enzyme, the rate of degradation of AMP was accelerated; in the scallop muscle, the conversion of AMP to HxR was accelerated considerably, as was the conversion of AMP to AdR in the abalone muscle. As a result, the author recognized that the dephosphorylation of AMP was the limiting step in the decomposition pathway of AMP.

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ABSTRACTER: M. M. Gwin

DEGRADATION OF NUCLEOTIDES IN SQUID

DEGRADATION OF NUCLEOTIDES IN SCALLOP AND ABALONE

2.02
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VI - ACID-SOLUBLE NUCLEOTIDES IN MUSCLE
OF MARINE INVERTEBRATES. DEGRADATION OF ADENYLIC ACID
IN THE MUSCLES OF PRAWN, CARP AND CALF

Arai, Ken-ichi
Bulletin of the Faculty of Fisheries Hokkaido University 17, No. 2, 99-109 (August 1966)

Degradation rates of adenosine 5'-monophosphate (AMP), inosine 5'-monophosphate (IMP), adenosine (AdR), and inosine (HxR) that had been added with a crude enzyme to the muscle extract of prawn, carp, and calf were studied by ion-exchange chromatographic analysis. When prawn extract was incubated at 37° C., the above-mentioned substrates changed as follows: 3.23 μ mole of AMP converted to IMP and HxR in 25 min.; 3.47 μ mole of IMP converted to HxR and hypoxanthine (Hx) in 25 min.; 1.60 μ mole of HxR converted to Hx in 6 hr. The main pathway of degradation of ATP in the muscle of prawn may be as follows: adenosine 5'-triphosphate (ATP)-adenosine 5'-diphosphate (ADP)-AMP-AdR-HxR-Hx. The route passing through IMP is not considered to be likely. When carp wax was incubated at 37° C., the substrates changed as follows: 5.32 μ mole of AMP converted to IMP in 15 sec.; 4.96 μ mole of IMP converted to HxR in 10 min.; 3.13 μ mole of AdR converted to HxR in 10 min.; 2.59 μ mole of HxR converted to Hx in 4 hr. Strong activity of adenylic acid deaminase was seen in carp muscle; however, the activity of adenosine deaminase was weak. The results indicate that the main pathway of degradation of ATP in the muscle of carp may be as follows: ATP-ADP-AMP-IMP-HxR-Hx. This pathway is a (over)

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ABSTRACTER: M. M. Gwin

2.03
LYSOLECITHINASE IN FISH MUSCLE

Cohen, H., M. Hamosh, R. Atia, and B. Shapiro (Department of Biochemistry, Hebrew University-Hadassah Medical School, Jerusalem, Israel)
Journal of Food Science 32, No. 2, 179-181 (March-April 1967)

A correlation may exist among the hydrolysis of tissue lipids, the denaturation of fish muscle proteins, and the deterioration that occurs during frozen storage of fish muscle. Establishing the enzymatic nature of the hydrolytic processes was thought necessary so that the active principle could be extracted from the fish muscle, this principle could be separated from its endogenous substrates, and the capability of the principle to catalyze the breakdown of added phospholipids could be tested. The purpose of the present study was to obtain such a preparation from fish muscle and to test its properties.

Obtaining the preparation proved to be a difficult task because the phospholipase activity was quite low. The lipid changes during autolysis in cold storage were usually measured over a period of weeks. In enzyme experiments with tissue preparation, however, it was undesirable to prolong incubation periods for more than a few hours if bacterial interference were to be avoided. Raising the temperature to +37° C. did not accelerate the autolytic process to the extent that short-term lypolysis studies could be undertaken with reproducible results. To increase the activities, it was necessary to increase the concentration of the muscle protein in the reaction mixture. This was accomplished by using a powder of the (over)

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ABSTRACTER: M. F. Tripple

DEGRADATION OF NUCLEOTIDES IN PRAWN AND CARP

LYSOLECITHINASE IN FISH MUSCLE

living muscle are described.

The rheology of myofibrillar proteins and deformation and contraction in the

recognized occurrence in the muscle of mammals. Calf extract was also incubated at 37° C. and the substrates changed as follows: 2.90 μ mole of AMP converted to IMP in 30 sec.; 7.79 μ mole of IMP converted to HxR in 90 min.; 6.29 μ mole of AdR converted to HxR in 10 min.; and 5.37 μ mole of HxR converted to Hx in 90 min. These results show a fairly strong activity of adenylic deaminase, whereas the activity of adenosine deaminase was weak. The main pathway of degradation of ATP in the bovine may be as follows: ATP-ADP-AMP-IMP-HxR-Hx. [12 references]

Post-mortem changes in the nitrogen compounds of muscle extracts from freshly caught ocean fish were studied by paper chromatography. In Gadus morhua, Trigla cuculus, Argentina silus, Merlangius merlangus, and Sebastes marinus stored from 2 to 3 weeks at temperatures of from -22° to -26° C., the changes were not significant. At open-air temperatures of from 3° to 12° , however, appreciable changes were noticed after a few days' storage. These latter changes can be retarded by storing the fish in ice cubes. Ungutted fish began to spoil sooner than gutted ones did.

2.02 EVOLUTION OF PLASMA LACTIC ACID AND GLUCOSE
IN THE STENCH APPROACHING SUFFOCATION BY CONFINEMENT

Bange-Barnoud, R. (Univ. Lyons, France)
Chemical Abstracts 63, 8783e (September 27, 1965)

Helgolander Wiss. Meeresuntersuchungen 8, No. 4, 383-403 (1963)
Abstracts from Current Scientific and Technical Literature 18, Abstract No. 414,
p. 76 (February 1965)

STUDIES OF POST-MORTEM CHANGES IN THE STABILITY OF LOW MOLECULAR WEIGHT NITROGEN COMPOUNDS IN THE MUSCULATURE OF OCEAN FISH

PROTEOLYSIS OF THE INTESTINE OF CASPIAN FISHES AND THE ISOLATION OF FISH PEPTONE

Nagaeva, D. Kh., and A. P. Chernogortsev
Chemical Abstracts 65, 6200c (August 15, 1966)

RHEOLOGICAL PROBLEMS OF COLLAGENOUS TISSUES

Harkness, R. D.
Lab. Pract. 15, No. 2, 166-170 (1966)
Abstracts from Current Scientific and Technical Literature 19, Abstract No. 1672,
p. 307 (July 1966)

The microstructure of the tissues and the methods for their rheological investigation are discussed.

The effects of Cu^{++} , Hg^{++} , and P^{-} on the rate of degradation of AMP, IMP, AdR, and HxR were studied and a comparison was made with the results obtained from the squid muscle. The authors concluded that the pathway of degradation of ATP in the muscle of scallop may be as follows: adenosine 5'-triphosphate (ATP) → adenosine 5'-diphosphate (ADP) → AMP → AdR → HxR → Hx, and in the muscle of abalone: ATP → DP → AMP.

muscle obtained by freeze drying. From this powder it was possible to extract the endogenous lipid substrates without destroying the activity toward added lysolecithin.

A phospholipase from fish muscle was prepared, and the preparation is described. The preparation splits added lysolecithin and contains practically no endogenous substrates. Active preparations were obtained from fresh *Saurida undecimnotata* and commercial cod preparations. Similar preparations from other fish species were inactive. Activity is lost after the fish is in frozen storage for several months. The preparation does not split lecithin; however, in the presence of lysolecithin, lecithin is also hydrolysed. This effect of lysolecithin is due to snake venom that is trapped during its preparation. Snake venom itself, however, does not split lecithin under the conditions used and becomes active in the presence of fish musclelysolecithinase preparations.

The enzymatic nature of phospholipase activity in fish muscle was established by isolating from the muscle a preparation that catalyzed the hydrolysis of added lysolecithin. Activities were obtained high enough to run experiments of 1 hour in length. The preparation contained negligible amounts of endogenous cleavable substrate.

Sonification and freezing activated the muscle enzyme to a high degree. The lack of activity of the preparation towards lecithin leaves unsolved the main problem of the factors leading to fatty acid formation during cold storage.

2.03

2.02

2.1121	STUDIES ON THE MECHANICAL CHARACTERS OF PATTI-AMI I - ON THE TENSIONS ON HEAD LINE AND FOOT ROPE Nonoda, Tokuro (Faculty of Fisheries, Prefectural University of Mie, Tsu, Mie Prefecture, Japan) Bulletin of the Japanese Society of Scientific Fisheries 33, No. 5, 385-391 (May 1967) In the coastal waters of Japan, a two-boat drag net called the patti-ami is used for catching such fish as anchovy and sand lance. The net is operated in all depths of water, from the bottom to the surface; for midwater operation, it is suspended from floats. The net has three parts: (1) a wing, which is composed of large-meshed webbing and is 200 meters or more long; (2) a bag, which is made of small-meshed minnow netting and is about 45 meters in circumference at the mouth; and (3) an intermediate part, which is composed of upper, lower, and side nets and which connects the bag and the wing. The manner of connecting and sewing the webbing and the amount of slack in the webbing are all critical factors in the construction of an effective net. Because the relation between the net design and the net form in action is not clear, opinions differ about the way to make the best net. As the first step in getting information about this relation, the author has studied the variations of tension on the head line and the footrope that result from changes in the manner of connecting the wing and the bag. (over)	COMMERCIAL FISHERIES ABSTRACTS VOL.21 NO.1 PAGE 5 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	ABSTRACTER: L. Baldwin
2.1125	THE N. AMERICAN AND EUROPEAN PURSE SEINE TYPES COMPARED Thomson, D. B. (College of Fisheries, Newfoundland, Canada) World Fishing 16, No. 6, 78-79 (June 1967) Purse seine designs can be divided into two basic types--the North American and the European. North American seines are roughly rectangular in shape and are composed of horizontal strips. The strips are hung at a ratio of 20-25 percent, and they may or may not be tapered at the ends. European seines are more bowl shaped and are composed of vertical strips hung at a ratio of 40-50 percent. The strips are usually tapered at one end or at both ends. The shape of a seine can be altered by the direction in which the strips are inserted. The fishermen using horizontal strips prefer them for two reasons. One, it makes mending easier, because a seine is usually hauled out by the length, and tears are more liable to occur that way. Moreover, the heavier joining twine prevents rips from travelling in a vertical direction. Two, when drawing up a seine, the horizontal strips allow the webbing to bag out from the cork line, which prevents the herring from spilling over the cork line if it is submerged. Norwegian and Icelandic seine fishermen prefer to hang the strips at a ratio of 40-50 percent, as this gives the nets added depth and prevents the webbing from puckering the cork line after setting. Drawing the cork line may result in the vessel's being pulled in over the net and fouling it. Canadian West Coast (over)	COMMERCIAL FISHERIES ABSTRACTS VOL.21 NO.1 PAGE 5 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	ABSTRACTER: E. R. Weissman

TENSION ON HEAD LINE AND FOOTROPE OF THE PATTI-AMI

COMPARISON OF PURSE SEINES

2.114	BIG POWER--EASY OPERATION--LOW MAINTENANCE HYDRAULIC WINCHES Schroer, H. K. Western Fisheries 73, No. 5, 34-36, 57 (February 1967) The hydraulic winch is coming into increasing use on fishing vessels, and it is being used to do work that was formerly done by hand. The design of winches has changed very little over the centuries, but the means of driving them has changed. Mechanical transmission of power is still the most common method, but this arrangement is awkward when the source of power is not close to the winch, as is often the case on a fishing boat. Hydraulic transmission of power, compressed air, steam, and electricity may all be used to drive winches when mechanical means are impractical. Some of the advantages claimed for hydraulic winches are size, versatility, and low maintenance costs. The hydraulic units, which are relatively small, can free deck space for other uses. No limitation exists on the location of a hydraulic winch, because the power source is located elsewhere, and the only connections to the winch are the hydraulic hoses. A single lever controls both the direction of the winch and its speed. A hydraulic winch applies constant torque at all speeds, so that the maximum load may be moved at any speed. The winch drum may be replaced by a drive gear or chain sprocket to convert the unit to a drive for fish pumps, conveyors, or other machines used on a fishing boat. Maintenance problems are reduced because hydraulic oil is a lubricant, reduces (over)	COMMERCIAL FISHERIES ABSTRACTS VOL.21 NO.1 PAGE 5 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	ABSTRACTER: E. R. Weissman
2.117	LABORATORY AT SEA Williams, Peter New Scientist 34, No. 542, 199 (April 27, 1967) The United States' OSS Oceanographer is the newest, largest, and most versatile oceanographic research vessel in the world. This ship is designed for long distance exploration and for efficient processing of data during the voyage. One of the main reasons for the efficiency and versatility of this vessel is the general design. The maximum cruising range of the Oceanographer at 16 knots is 13,000 nautical miles, and the vessel can be provisioned for 150 days at sea. Available storage capacity for fresh water is 25,000 gallons, and the capacity of the distiller is 8,000 gallons per day. The ship is constructed of welded steel and is reinforced for operation in floating ice. The ship is air conditioned for work in tropical conditions. A passive-rolling tank permits work to be carried on in rough seas. Four 1,150-kw.diesel generators provide power to the two 2,500-s.hp. electric motors, which are the main propulsion units; to the bow thruster, which is located in a transverse tunnel through the hull and which develops 10,000 pounds of thrust for precision maneuvering and keeping the ship on station during certain experiments; and to the deep-sea winch. (over)	COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 1 PAGE 5 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	ABSTRACTER: M. M. Gwin

HYDRAULIC WINCHES ON FISH BOATS

NEWEST MARINE RESEARCH VESSEL

2.1125

fishermen are used to deep seining of herring, and they feel it is just as easy to add another horizontal strip of webbing to increase depth.

Most European seines have a tapered bunt so the seine can be drawn up with the power block while brailing is in progress. The tapered bunt also lessens the danger of the webbing's becoming tangled with the purse line near the ends of the seine.

American seines are rectangular in shape; a winch and tackle are required to draw up the surplus webbing during brailing. To offset the danger of net entanglement and to draw up the wing ends before pursing, fishermen insert breast lines. These lines are drawn up as pursing begins. The danger of entanglement is greatest in the early stages of pursing, so the purse line is slowly drawn as pursing begins.

Nylon appears to be the most popular synthetic material for construction of purse seines. Some experts believe that nylon, with a specific gravity of 1.14, is too light for use in a purse seine, so these people recommend polyester to give better sinking speed to the net. Other experts argue that the weight of the twine is not a critical factor, since more weight can easily be added to the lead line. A large purse seine may carry well over a ton of lead.

To allow the top part of the net to sink and to keep the lower part up from the purse line, it is suggested that the upper parts be constructed of nylon and the lower parts be constructed of polypropylene or some other material that would float. This suggestion would be useful to those working purse seines in shallow water.

2.1121

Two model nets were used in the study. Both were 1/90 scale, but in net 1 the center line of the wing was on a level with the lateral center line of the bag, and in net 2, the center line of the wing was 3.5 centimeters above the lateral center line of the bag. The mouth height--that is, the vertical distance from the forward end of the upper net to the lower net--was larger in net 2 than in net 1. In each net, the ratio of mouth height to mouth width was adjusted to give a value of 1.0, 0.75, or 0.54.

Each net was tested in an experimental circulating tank where the tensions on the head line and the footrope were measured under various current velocities while the net form was being photographed from above and from the side. Strain gages attached to a pickup set on the front end of the head line or of the footrope transferred tension-induced deflections to an oscillograph.

The measurements showed that the amount of tension on the head line of net 2 was smaller than the tension on the footrope, whereas the tension on the head line of net 1 was about equal to that on the footrope. The resistance of the bag varied little with mouth shape; thus the relation between resistance (R) and current velocity (V) was expressed as $R = 0.155V^2$ (in gwt, cm/sec units).

Among the equations the author also derived were those for calculating the values of eight dimensionless parameters relating to head line and foot rope: the tensions at the forward end of the head line, at the joining point of two parts of the head line, and at the rear end of the head line; the angles at which each of these sections of head line deviate from the direction of the current; and the relation between the head line and the transverse distance across the current between extremities. Comparison of observed and calculated values coincided acceptability.

2.117

The Oceanographer carries in it a large oceanographic laboratory area; the modular laboratory furniture allows the area to fit in with the particular experiments in progress. A well, which is placed at the aft end of the main deck superstructure, extends downwards from the center of the laboratory; it can be used by skin divers or for casting special equipment.

Equipment aboard the vessel measures and records course and speed, magnetic field intensity, gravity, surface current and temperature, temperature at depth, and ocean depth. Special equipment makes it possible to take water samples at various depths and to obtain 100-foot core samples from the deepest ocean floors. A newly developed system allows the ship to receive information from weather satellites so that a weather picture of the local area is readily available.

The Oceanographer is unique in its application of the computer, which allows a high degree of automation in working of the ship and also allows processing of data collected during the voyage. Although propulsion and other machinery of the ship is automated with a centralized engineroom control, it can also be controlled at master points in both the engine room and on the bridge. Because controlling and monitoring the operation of the vessel only requires about 25 percent of the capability of the computer, the computer is used principally by the data acquisition system. This system samples through sensors that record and process geophysical, oceanographic, hydrographic, and meteorological data. At the same time, the ship's position is continuously logged. Use of the computer releases highly trained personnel for tasks other than sorting and analyzing data.

2.114

Internal wear and immunizes the unit to condensation, corrosion, and other problems associated with salt-water service. The author claims that hydraulic winches are also extremely simple and safe to operate because they incorporate an automatic internal brake.

The basic hydraulic circuit consists of a reservoir of hydraulic fluid, a hydraulic pump, a control valve, a filter, and the winch. The pump is supplied by the reservoir and provides the power for the system. The control valve is operated by the single lever and incorporates a pressure relief, which is set for the power required at the winch. The hydraulic fluid is returned to the reservoir from the control valve via the filter. The system becomes more complicated as more winches are added, but the basic circuit remains the same. The manufacturer should be consulted when there is any doubt about the proper application of a particular winch or the addition of a winch to an existing hydraulic system. Thought must be given to the correct hose size for a particular winch.

A well-engineered hydraulic circuit in which the fluid is kept free from contamination will repay by long, reliable service the time and effort involved in initial installation.

2.12	THE SUBMARINE PISCES AS A FISHERIES TOOL High, William L. (Bureau of Commercial Fisheries, Exploratory Fishing and Gear Research Base, Seattle, Washington) Commercial Fisheries Review 29, No. 4, 21-24 (April 1967) The Bureau of Commercial Fisheries chartered the two-man submarine Pisces in 1966 for the following reasons: (1) to provide the opportunity to evaluate the suitability of small submarines for fishery investigations; (2) to observe the behavior of the Pacific hake (<i>Merluccius productus</i>) under natural conditions and under the influence of lights and capturing gear; and (3) to determine whether the submarine could be operated near pelagic trawls. The Pisces was lowered into the water from a barge with support facilities and was towed to the nearby diving location with a 30-foot launch. The submergence procedure took about 10 min. as buoyancy was altered by transferring oil from bladders to spheres. Buoyancy control has the advantages that weight does not need to be dropped after each dive or installed before descent and that the submarine can stop at any midwater depth and quickly rise and descend as often as needed. The sink rate was controlled by manipulating the oil level within the spheres, but the rate was usually about 30 feet per minute to allow for observations of plankton layers and midwater fish species. The Pisces could readily suspend when (over) COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 1 PAGE 7 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: M. M. Gwin	2.3 (*) Busta, F. F. (Department of Food Science, North Carolina State University, Raleigh, North Carolina 27607) Applied Microbiology 15, No. 3, 640-645 (May 1967) Information on thermal inactivation of bacterial spores at ultrahigh temperatures is limited and is especially scarce on inactivation of spores heated in processing equipment by direct steam injection. The effects of processing with ultrahigh temperatures on <i>Bacillus subtilis</i> spores have been investigated and several unusual responses of the spores to the heat treatment noted. The results of this investigation indicated a definite need for studies on spores of greater heat resistance, such as those produced by certain strains of mesophilic anaerobes and thermophilic aerobes. Data on the thermal inactivation of this type of spores at temperatures in excess of 121° C. are limited; none of the investigators used heating conditions and procedures that could be adequately extended to ultrahigh temperature treatment of spores in milk by direct steam injection. Additional studies were necessary to obtain information useful in the evaluation of ultrahigh temperature processing. The present study was initiated to describe the thermal inactivation characteristics of spores produced by <i>B. stearothermophilus</i> strain 1518 (smooth) and putrefactive anaerobe 3679 strain NCA and to evaluate factors that influence the inactivation constants. Thermal inactivation characteristics of the bacterial spores and putrefactive anaerobe spores suspended in skim milk were determined after treatment in *Item on back of card. (over) COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 1 PAGE 7 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: M. F. Trippie
2.1476	FUNDAMENTAL STUDIES ON THE PHENOMENA OF STICK IN GILL-NETTING. II - THE MEASURING METHOD OF THE TIME ELAPSED AFTER STICKING IN MESH AND THE PROBLEM OF ITS UTILIZATION Nashimoto, Katuaki Bulletin of the Faculty of Fisheries Hokkaido University 17, No. 1, 33-46 (May 1966) Although gill nets are generally set before dusk and are hauled in at dawn, it is not known when the fish become caught in the meshes of the net. Ascertain- ing the time at which fish become caught in gill nets would aid in the improve- ment of fishing methods. The author decided that if the elongation and the tension of the net or the load of fish and the depth of the net's impression in the fish bodies were known, the length of time that the fish had been stuck in the net could be calculated. A tension meter constructed of a thin vinyl bag, a pressure gauge, and an air pump were made to show the amount of pressure that the twine of the net would make on the skin of the fish and thus would indicate at what time the fish became stuck in the net. The relation between the tension of the net and the pressure in the thin bag was expressed in these formulae: $P = \frac{T}{R.d. f(\theta')}$ $[f(\theta') = \frac{1}{2}(1 - \cos \theta')]$ (over) COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 1 PAGE 7 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: M. M. Gwin	2.6 Twedt, Dik (Marketing Research, Oscar Mayer and Company, Madison, Wisconsin) Food Product Development 1, No. 3, 24, 26, 50-51 (June-July 1967) (Arlington Publishing Company, 2 N. Riverside Plaza, Chicago, Illinois 60606) All objects have attributes that can be expressed in physical units of meas- ure. There are times, however, when the marketing researcher needs to know the perceptual equivalent of some physical-scale value. For such measurements, he uses a psychophysical scale. Although psychophysical scales, which measure such per- ceptual equivalents as "which package appears to be larger?" have proved their value to researchers in the past, present day analysts are faced with the problem of measuring opinion and attitude dimensions, characteristics that have no corre- sponding physical dimensions. On the assumption that these dimensions are contin- uous, just as physical attributes are continuous, the scales that have been constructed to express them are called psychometric scales. To be precise, a psychometric scale must be valid (that is, it must measure what it purports to measure), reliable (it must yield substantially the same score as long as what is measured remains unchanged), unidimensional (its terminals must refer to only one attribute), and equi-intervallic (each unit in the scale must be as nearly equal to every other unit as possible). Some 40 years ago, Thurstone and his co-workers at the University of Chicago devised an 11-point scale for measuring attitudes. They assumed that, regardless (over) COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 1 PAGE 7 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: L. Baldwin

where R = radius of the curve of the fish body, θ' = pressure angle between the net and the skin of the fish, P = pressure in the vinyl bag, d = diameter of the net twine, and T = tension of net twine.

If the depth of the impression is constant during a short time, the relation between P and T is linear and independent of the width of the vinyl bag. When the depth of the impression is small, $f(\theta')$ is about equal to $\frac{1}{2}(1 \cos \theta')$. But when the impression is deep, $f(\theta')$ is complex and theoretically out of line.

Measuring two groups of mackerel, five fish to a group, the author obtained the following results. (1) The relation between the tension of net and the pressure of the bag was linear when the tension was low (about 0.4 kg.); the relation changed exponentially when the tension was moderate (in the 0.4-0.8 kg. range); but when the tension was greater than 0.8 kg., the pressure deviated from the exponential line. (2) Pressure in the bag was slightly influenced by the size of the fish and by the depth of the impression in the fish's body. (3) The pressure changed with time. (4) A vinyl bag narrower than 1.7 cm. was more practical than a wider one was.

From the measurements, the following conclusions were drawn: (1) Since time is so critical to changes in R and θ' , the influence of these factors cannot be calculated from the theoretical formula. (2) Because the depth of the impression in the fish may change with time, the estimate of elapsed time after the fish becomes caught in the net may be inaccurate; the measured error may be 20 percent of the total estimated time. (3) To measure the elapsed time more accurately, one must probe the relation between the tension of the net and the pressure of the net on the fish; he must also devise a more efficient tension meter.

[12 references; in Japanese]

fairly far under water. Tilt of the submarine occurred when actuating a hydraulic ram that moved the battery case along a short track. Verbal communication was maintained with the launch at all times by a directional transducer. The life-support system aided in keeping the interior dry and in reducing headaches and general physical discomfort. The atmosphere was analyzed for CO_2 and relative humidity every 45 min.; the CO_2 level never exceeded 0.9 percent.

At the end of dives, buoyancy was increased by transferring oil from the spheres to bladders. This method provided a slow, constant rate of ascent. Because of a protective sail around the hatch opening, personnel could be conveniently transferred without lifting the submarine from water.

Twenty-nine dives occurred with an average dive of 256 ft. for 56 min.; however, one 2-hr. dive reached 552 ft. Near the surface of the water, objects could be distinguished at 15 to 20 ft.; in deeper waters and near the bottom, visibility at times was reduced to 3 ft.

The *Fishes* was unable to follow the midwater trawl effectively because the magnetic compass reacted too slowly, turns were difficult to control because of the submarine's momentum, heavy discharge rates on batteries restricted running time, and available power was used up quickly.

The investigators concluded that that biological surveys can be successful, particularly on rough bottom areas not suitable for conventional sampling gear. The vessel is now equipped with a skid to provide room for large instrumentation packages, and so that a third man can be carried. Equipment to be installed for the future includes a direct-reading current meter, a depth telemetry system, a gyrocompass, and an improved submarine tracking system.

of a person's bias, he could place appropriate scale values on an attitudinal continuum. A panel of judges was used to sort, select, and position on the scale items from a large pool of simple, clear, short opinions about a given subject.

In 1932, Rensis Likert introduced a method for developing attitude scales whereby the scores obtained during a check of five intensity responses were weighted from 1 to 5, depending on the intensity of the checker's attitude. No panel of judges was required.

Louis Guttman's method, introduced in 1944, was based on matrix algebra. Its chief feature was the elimination of items that did not fall on the principal continuum, thereby ensuring a more unidimensional final scale.

Ten years ago, Charles Osgood and Percy Tannenbaum introduced the semantic differential, a 7-step, bipolar scale anchored at each end by a duo of (usually) opposite adjectives. Although new scales must be developed and validated for each new problem, the semantic differential is easily administered and can be made to cover many attitudinal dimensions in a relatively short time.

Yet another recent scaling method has been introduced by Jan Stapel of the Netherlands Institute of Public Opinion. This 11-point scale is based on a neutral 0, with a +5 being the highest degree of "like," say, and a -5 being the highest degree of "dislike."

These scales are all fairly valid and reliable, but interpretation of the scores is still a problem. One of the more promising ways of estimating a product's market potential is by weighing the individual's response against the actual volume of the product he consumes.

plant ultrahigh-temperature processing equipment. Temperature-survivor curves from plots of the logarithm of percent survival against exposure temperature emphasized the critical nature of temperature control in process evaluation. The time-survivor curves for putrefactive anaerobe spores were concave and went up. Decimal-reduction-time curves for these spores supported the observation of a protective response occurring at the longest exposure times. Exposure time, however, did not markedly affect the extremely high zD value (D and z values are thermal inactivation constants) obtained for putrefactive anaerobe spores. Substituting Gelysate for Trypticase and Thiotone as the peptone in the sporulation medium increased the relative heat resistance of *B. stearothermophilus* spores; however, Gelysate lowered the zD value from 16° to 12° F. This emphasized the influence of different peptones in the sporulation medium. The decimal-reduction time curves in all cases were linear, but the zD values obtained in this study differed considerably from those reported by other workers. [20 references]

for harder use, such as for deboning.

NEW INVESTIGATIONS ON THE HYGIENIC AND TECHNOLOGICAL SUITABILITY OF PLASTIC CUTTING BOARDS

Grossklaus, D., and R. Levetzow
Fleischwirtschaft 47, No. 1, 38-40 (1967)
Abstracts from Current Scientific and Technical Literature 20, No. 6, Abstract No. 1344 (June 1967)

Bacteriological, histological, and durability tests of seven types of plastic cutting boards demonstrated their superiority to wooden boards. The polyamide, hard rubber, and synthetic rubber boards are also suitable, with some reservations,

<div data-bbox="61 126 255 1247"> <p>3.15 INFLUENCE OF CULTURE MEDIA ON THE RADIATION RESISTANCE OF MICROCOCCUS RADIODURANS</p> <p>Krabbenhoft, K. L., A. W. Anderson, and P. R. Elliker (Department of Microbiology, Oregon State University, Corvallis)</p> <p>Applied Microbiology 15, No. 1, 178-185 (January 1967)</p> <p>The nonsporeforming, pink-pigmented tetracoccus, <u>Micrococcus radiodurans</u>, is neither pathogenic nor heat resistant, but it is highly resistant to ultraviolet and γ radiation. An earlier study indicated that the cell yield of <u>M. radiodurans</u> could be about doubled by changing the type of culture medium. The present study was undertaken to determine what effect changing the type of culture medium would have on the radioresistance of <u>M. radiodurans</u>.</p> <p>The culture medium that had been used in earlier radiation studies was composed of tryptone, glucose, yeast extract, and DL-methionine (TGYM). It was later found that a medium of tryptone, glucose, yeast extract, and a tryptic digest of casein (PCNZ) yielded superior growth of <u>M. radiodurans</u>. However, in the present study it was found that <u>M. radiodurans</u> grown on PCNZ medium were ten times more sensitive to radiation than were those grown on TGYM medium.</p> <p>An inverse relation was found to exist between the level of tryptic digest of casein in the growth medium and radiation resistance. Furthermore, cells grown in high levels of casein digest appeared to be the least pigmented. The</p> <p>(over)</p> </div> <div data-bbox="255 126 873 1247"> <p>COMMERCIAL FISHERIES ABSTRACTS VOL 21 NO. 1 PAGE 9</p> <p>UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE</p> <p>ABSTRACTER: E. R. Weissman</p> </div>	<div data-bbox="61 126 255 1247"> <p>3.15 I - PRESERVATION OF FISH BY THE USE OF GAMMA RAYS</p> <p>Ronsivalli, Louis J. (Bureau of Commercial Fisheries Technological Laboratory, Gloucester, Massachusetts), Lena Baldwin, and F. Bruce Sanford (Bureau of Commercial Fisheries Branch of Reports, Seattle, Washington)</p> <p>Commercial Fisheries Review 29, No. 6, 56-60 (June 1967)</p> <p>Man has traditionally salted, smoked, pickled, or fermented fish to prevent the rapid spoilage of untreated fish. These treatments, however, not only impede the advance of spoilage, they appreciably alter the flavor of the product. Newer methods of preserving fish, such as canning, freezing, and chilling, come close to the goal of retaining fresh flavor, but canned frozen fish still lose their fresh flavor either during processing or during storage, and chilling works for only a few days. Fish with a fresh taste ordinarily have only been available to people within easy transportation range of the capture areas. Now many people who live beyond this range may enjoy the flavor of fresh fish. When chilling is combined with a gamma-radiation treatment, the period of freshness is markedly extended, and fish may be shipped great distances.</p> <p>Foods are normally spoiled by bacteria, which are present in meat and fresh fish. Gamma rays work in two ways to destroy bacteria. A direct hit on a bacterium by a gamma ray acts much the same way as a bullet and the bacterium is destroyed almost instantaneously. Gamma radiation may also set lethal secondary chemical effects in motion within the environment of the bacteria.</p> <p>(over)</p> </div> <div data-bbox="255 126 873 1247"> <p>COMMERCIAL FISHERIES ABSTRACTS VOL 21 NO. 1 PAGE 9</p> <p>UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE</p> <p>ABSTRACTER: E. R. Weissman</p> </div>
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<div data-bbox="61 1260 255 2507"> <p>3.15 EFFECT OF OXYGEN TENSION ON THE SPOILAGE MICROFLORA OF IRRADIATED AND NON-IRRADIATED HADDOCK (MELANOGRAMMUS AEGLEFINUS) FILLETS</p> <p>Licciardello, J.J. (Department of Nutrition and Food Science, Massachusetts Institute of Technology, Cambridge, Massachusetts), and L. J. Ronsivalli and J. W. Slavin (Bureau of Commercial Fisheries Technological Laboratory, Gloucester, Massachusetts)</p> <p>Journal of Applied Bacteriology 30, No. 1, 239-245 (April 1967)</p> <p>The microbial flora of a food product undergoes both a quantitative and a qualitative change when treated with ionizing radiation. The effect on haddock and clams of irradiation and storage under aerobic conditions has already been studied. Haddock and other fish products are canned and stored under vacuum to reduce oxidation during storage. The radiosensitivity, outgrowth, and rate of growth of many microorganisms are affected by oxygen tension.</p> <p>In the present study, skinless haddock filets were treated with a pasteurizing dose of ionizing radiation and stored at about 35° F. under either high or low oxygen tension. The filets stored under high oxygen tension were packed in cans covered with a thin polyethylene film that was sealed with rubber bands. The filets stored under low oxygen tension were packed in cans evacuated at 27 in. of mercury and sealed with metal covers.</p> <p>(over)</p> </div> <div data-bbox="255 1260 873 2507"> <p>COMMERCIAL FISHERIES ABSTRACTS VOL 21 NO. 1 PAGE 9</p> <p>UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE</p> <p>ABSTRACTER: E. R. Weissman</p> </div>	<div data-bbox="61 1260 255 2507"> <p>3.15 NOTE ON THE TEMPERING OF FISH FINGER BLOCKS</p> <p>Sanders, H. R. (Torry Research Station, Aberdeen, Scotland)</p> <p>Journal of Food Technology 2, No. 2, 183-187 (June 1967) (Blackwell Publications, Ltd., 5 Alfred Street, Oxford, England)</p> <p>Fish sticks are rectangular parallelipeds of fish; they are cut from frozen blocks of fish filets (usually cod), breaded, often precooked, and refrozen. The cutting operation is divided into three steps. In the first, the frozen fish block is divided into three portions by two cuts made parallel to the longest sides. In the second, each of the portions is sliced into strips by cuts made parallel to the major faces. In the third, the strips are cut into individual sticks. Either band saws or gang saws are commonly used to make the cuts---and herein lies the problem. About 1/16 inch of fish is lost as sawdust during each of the cutting operations. For the first two steps, this weight loss amounts to only about 5 percent; but for the final cutting, the loss is nearer 10 percent.</p> <p>This loss can be eliminated by the use of guillotine-type cutters. However, unlike saws, cutters cannot be used on block that are at normal cold-storage temperature---the blades will wear out quickly; the cuts may not be straight, resulting in sticks of varying weight and a consequent need to increase the mean weight to ensure the correct minimum weight; blocks tend to split and crack. The combined losses from these causes may exceed the loss from sawdust. The solution is to raise the temperature of the blocks to between 5° and 15° F. before guillotining begins.</p> <p>(over)</p> </div> <div data-bbox="255 1260 873 2507"> <p>COMMERCIAL FISHERIES ABSTRACTS VOL 21 NO. 1 PAGE 9</p> <p>UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE</p> <p>ABSTRACTER: L. Baldwin</p> </div>
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<div data-bbox="890 126 1084 1247"> <p>3.15 RADIATION RESISTANCE OF MICROCOCCUS</p> <p>EFFECT OF RADIATION AND OXYGEN TENSION ON MICROFLORA OF HADDOCK</p> </div> <div data-bbox="1084 126 1755 1247"> <p>COMMERCIAL FISHERIES ABSTRACTS VOL 21 NO. 1 PAGE 9</p> <p>UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE</p> <p>ABSTRACTER: E. R. Weissman</p> </div>	<div data-bbox="890 126 1084 1247"> <p>3.237 RADIATION PRESERVATION OF FISH</p> <p>TEMPERING FISH BLOCKS FOR GUILLOTINE CUTTING</p> </div> <div data-bbox="1084 126 1755 1247"> <p>COMMERCIAL FISHERIES ABSTRACTS VOL 21 NO. 1 PAGE 9</p> <p>UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE</p> <p>ABSTRACTER: L. Baldwin</p> </div>
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<div data-bbox="890 1260 1084 2507"> <p>3.15 RADIATION PRESERVATION OF FISH</p> <p>TEMPERING FISH BLOCKS FOR GUILLOTINE CUTTING</p> </div> <div data-bbox="1084 1260 1755 2507"> <p>COMMERCIAL FISHERIES ABSTRACTS VOL 21 NO. 1 PAGE 9</p> <p>UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE</p> <p>ABSTRACTER: L. Baldwin</p> </div>	<div data-bbox="890 1260 1084 2507"> <p>3.237 RADIATION PRESERVATION OF FISH</p> <p>TEMPERING FISH BLOCKS FOR GUILLOTINE CUTTING</p> </div> <div data-bbox="1084 1260 1755 2507"> <p>COMMERCIAL FISHERIES ABSTRACTS VOL 21 NO. 1 PAGE 9</p> <p>UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE</p> <p>ABSTRACTER: L. Baldwin</p> </div>
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Radiation preservation of fish may take the form of either pasteurization or sterilization. Sterilization is a process that destroys all the bacteria present on the fish. Enzymes that might cause spoilage are also destroyed during radiation sterilization. If the fish is packed in a bacteria-tight container before irradiation, it may be stored for a long time without spoiling. Radiation sterilization has the advantage over heat sterilization in that it does not destroy the firmness of the flesh. However, the amount of radiation needed to destroy all the bacteria present is so high that it causes the fish to smell and taste overcooked or even burned. Still higher radiation doses are needed to destroy the enzymes. Recent studies indicate that irradiation at an extremely low temperature will not produce the objectionable flavors and odors that presently characterize sterilized fish.

Radiation pasteurization is a process whereby most bacteria on the fish are destroyed. Considerably lower radiation doses are required for pasteurization than for sterilization. In general, the shelf life of radiation pasteurized fish is two to three times longer than that of unirradiated fish kept at the same temperature.

Scientists have investigated the possibility that irradiated fish might be harmful to the consumer. The investigations have not shown any instance of radioactivity or toxic substances in irradiated fish. The investigators believe that properly handled irradiated foods are perfectly safe for human consumption.

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authors suggest that pigmentation and radiation resistance may be related.

No "recovery medium effect" was seen with M. radiodurans. Cells grown on TGYM medium had a recovery rate of about 60 percent, whether they were recovered on TGYM or PCNZ media; those grown on PCNZ had a recovery rate of about 6 percent, no matter which recovery medium was used. The growth pattern of M. radiodurans on the two media was similar, which indicated that growth was balanced.

No difference was found in the relative amounts of deoxyribonucleic acid, ribonucleic acid, and protein, or in the pH of the medium of M. radiodurans grown on the two different media. The authors did not feel that quantitative differences in these factors affected the ten-fold difference in radiation sensitivity of the organism when grown on the different media. The sensitivity of M. radiodurans to ultraviolet radiation was affected by growth on the different media in the same way as was its sensitivity to radiation.

The authors found evidence that the growth media caused cellular biochemical alterations in the organism. Radiation resistance was reversed by exposure to a growth medium other than the initial growth medium. Cells grown in PCNZ medium became radioresistant after 3 hours' exposure to TGYM medium. The authors believe this indicates that precursors of factors related to increased resistance were probably present in the cells originally grown in PCNZ, but the factors themselves could not be synthesized in that medium.

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A special conditioning room could be used to temper the blocks, but since at least 48 hr. is needed for the temperature throughout the blocks to reach the desired level, the additional space and time requirements make the method impractical. A conditioning room kept at a temperature of $65 \pm 5^\circ$ could be used, as could ducts through which room-temperature air could be blasted over the blocks on their way to the sawing room; but the danger of overheating part of their surface is too real. The answer lies in the use of two electrically heated platens formed by sandwiching a heating element between stainless-steel plates. Operation is simple and easily controlled; the fish blocks are placed between the bottom platen and the top platen, and the heaters are switched on.

Processing 360 blocks an hour, or 2 tons an hour, requires a normal 10-min. heating cycle, for 60 fish blocks can be heated at a time. If each layer on the platen consists of four blocks, the dimensions of the pile of fish blocks (the thickness of the platens aside) is 40 in. long by 20 in. deep by $22\frac{1}{2}$ in. high. By using two assemblies, the operator can load or unload one while the other is operating. Since the platens can be designed in accordance with the power available, no transformer is needed. The only special electrical equipment is a switch, preferably an adjustable timing type. The power required is 14 kw.

By using electrically heated platens, the processor can bring $1\frac{1}{2}$ -inch-thick blocks of fish from -20° F. to the desired temperature in 20 min. The initial temperature can be varied by 15° .

3.15

The initial total plate count of the control sample was 320×10^3 bacteria per gram. Irradiation reduced the initial bacterial count 150- to 300-fold, the smaller reduction occurring in the vacuum-packed samples. After 13 days' storage at 35° F., the unirradiated air-packed sample had a total plate count of about 10^9 bacteria per gram and a rank, putrid odor; the unirradiated vacuum-packed sample had a total plate count of 2.3×10^6 bacteria per gram and a slightly fishy odor. Storage of the unirradiated vacuum packed control at 35° F. for another 19 days resulted in a total plate count of about 8×10^6 bacteria per gram and a fishy odor, which was judged not to be as obnoxious as the odor of the spoiled air-packed control. The difference in spoilage odor was thought to result from differences in both the quantity and type of microflora in the spoiled fish.

Pseudomonads constituted the main spoilage flora both under high and low oxygen tension in the unirradiated samples. By 13 days, the proportion of lactobacilli in the spoilage microflora spectrum had begun to increase. Irradiation shifted the microflora spectrum to the extent that the pseudomonads either were destroyed completely or were reduced to such low levels that they were not detected. Achromobacters were the main spoilage flora in the air-packed samples. The spoilage flora were entirely lactobacilli in the vacuum-packed samples. These lactobacilli were thought to be contaminants from commercial fish-processing plants or fishing boats, rather than to be natural components of the microbial flora of fresh fish.

When the irradiated samples were judged to be spoiled, the bacterial count exceeded 10^7 per gram, yet the odors were not obnoxious. The authors concluded that this observation confirmed other findings that bacterial spoilage of fish is "not necessarily related to the number of organisms present but is related to the types of organisms."

4.11 THE THIN LAYER CHROMATOGRAPHIC SEPARATION OF FATTY ACID METHYL ESTERS AND GLYCERIDES ACCORDING TO CHAIN LENGTH AND UNSATURATION

Ord, W. O., and P. C. Bamford (Unilever Research Laboratory, The Frythe, Welwyn, Herts, England)
Chemistry and Industry, No. 7. 277-278 (February 1967)

Reverse-phase thin-layer chromatography on silanized silica gel chromatoplates has been used to separate fatty acid methyl esters according to their chain length. This method, however, fails to separate certain critical pairs of fatty acid methyl esters, such as methyl palmitate and methyl oleate, because a double bond and two methylene groups act in nearly equal and opposite ways on the mobility of these pairs. These critical pairs of esters may be separated according to their degree of unsaturation on chromatoplates impregnated with silver nitrate, but separation by chain length does not occur.

Methyl esters and glycerides have been separated according to both chain length and degree of unsaturation on paper impregnated with dodecane that was developed for 12-48 hr. with aqueous methanol solutions saturated with silver nitrate and dodecane. The authors used silanized silica gel chromatoplates that were developed for 90 min. with developing solvents containing silver nitrate to achieve the same results. Mixtures that were not completely separated by conventional reverse-phase chromatography or by chromatography on silver nitrate impregnated plates have been completely resolved on thin-layer chromatoplates.

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UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: E. R. Weissman

4.13 SEASONAL CHANGES IN GENERAL CONDITION AND LIPID CONTENT OF COD FROM INSHORE WATERS

Jangaard, P. M., H. Brockerhoff, R. D. Burgher, and R. J. Hoyle (Fisheries Research Board of Canada Halifax Laboratory, Halifax, Nova Scotia)
Journal of the Fisheries Research Board of Canada 24, No. 3, 607-612 (March 1967)

Seasonal variation in lipid content and general condition of cod (*Gadus morhua* L.) were determined. Lipids from the flesh and oil content of the livers were measured. The general condition of the fish was expressed by the formula: $K_F = \frac{\text{weight of fish} \times 100}{(\text{length})^3}$, where the weights are given in grams and the lengths in centimeters. The formula $K_L = \frac{\text{weight of liver} \times 100}{\text{weight of fish}}$ was used to calculate the condition of the liver.

These two formulas were used to plot monthly indices for overall condition and liver condition. Because only eight fish were sampled, considerable variation was found. The maxima for both overall condition (K_F) and liver condition (K_L) were found in late summer and fall, July to November. The indices then dropped and were at a low level until spawning was completed in March-May and the fish resumed heavy feeding in June. The seasonal variation in K_F was from 0.79 to 1.05, and in K_L from 1.0 to 4.5.

The lipid content of the flesh, along with the amount of phospholipids and nonphospholipids (neutral lipids), were plotted. Lipid content of flesh ranged

*Item on back of card.
COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 1 PAGE 11
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: M. F. Tripple

3.249 THE INFLUENCE OF LIPIDS ON FISH QUALITY

Ackman, R. G. (Fisheries Research Board of Canada Halifax Laboratory, Halifax, Nova Scotia)
Journal of Food Technology 2, No. 2, 169-181 (June 1967) (Blackwell Scientific Publications, Ltd., 5 Alfred Street, Oxford, England)

Despite the fact that lipids influence the quality of fish through their interaction with other biological materials, these interactions have been only partly examined. In the present report, the author correlates his own findings with those previously reported on the interaction of free fatty acids (FFA) with protein to produce texture deterioration and the interaction of various biological components with tocopherol to cause rancidity.

Cod, which is a lean fish, having about 1 percent lipid, was the primary fish of reference. The lipids in cod flesh are almost exclusively cellular, essentially phospholipids, and thus do not fluctuate as markedly as depot lipids do. Although the dark muscle of the cod is richer in extractable lipid than the white muscle is, the two types of muscle contain essentially the same proportion and type of lipids. Thus the cod is a less complicated fish to work with than the more fatty species are.

In frozen, stored cod, rancidity is rarely a problem; rather, the problem is one of protein denaturation, which causes a deterioration of texture in the product. Such denaturation has been correlated with the reduced extractability of

COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 1 PAGE 11
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: L. Baldwin

3.3342 CAUSES OF CAN SWELLING AND BLACKENING OF CANNED BABY CLAMS. II - BACTERIAL ACTION INVOLVED IN CAN SWELLING AND BLACKENING OF BABY CLAMS

Tanikawa, Eiichi, Terushige Motohiro, and Minoru Akiba (Laboratory of Marine Food Technology, Faculty of Fisheries, Hokkaido University, Hakodate, Japan)
Journal of Food Science 32, No. 2, 231-234 (March-April 1967)

Clostridium nigrificans has been identified as a causative microorganism of sulfide spoilage in canned products. This organism is also known to be involved in blackening of canned foods. Bacteriological investigation of Japanese baby-clam canneries has confirmed bacterial contamination of the canneries. These investigations, however, were concerned with bacterial flora discovered in the environment of the canneries, not with the bacterial flora in the meat from canned baby clams. This report covers bacterial action involved in the blackening and swelling of canned baby clams.

Sample blackened cans were incubated for 2 months at 37° C., during which time the cans swelled. The cans were aseptically opened, and portions of meat and liquid were put into glucose liver broth and then held in a closed vessel for 14 days at 37° and 55° C. The bacteria grown in the broth were cultivated and incubated in closed vessels to obtain anaerobiosis at 37° and 55° C. Of the strains isolated from blackened meat from swelled cans, three strains were related

COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 1 PAGE 11
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: M. F. Tripple

INFLUENCE OF LIPIDS ON FROZEN-STORED FISH

SWELLING AND BLACKENING OF CANNED BABY CLAMS

SEPARATION OF METHYL ESTERS AND GLYCERIDES

CHANGES IN COD CONDITION AND LIPID CONTENT

3.3342

only to blackening, two strains were related only to swelling, and only one strain was related to both phenomena. It was concluded that the bacteria concerned with blackening and swelling existed in the pack of canned baby clams.

The two major observations of an abnormally high level of hydrogen sulfide and can swelling during the incubation test on canned baby clams suggested that the spoilage is caused by bacterial action. All the bacteria isolated from the blackened meat are considered to be thermophilic spore formers, some of these species may evolve gas from a medium containing baby clam extract, and other species may produce hydrogen sulfide. The bacteria involved in the blackening could decompose some kinds of sulfur-containing amino acids to evolve hydrogen sulfide and simultaneously decompose hemocyanin from baby clams to liberate copper. The reaction between hydrogen sulfide and copper could cause the blackening in the canned baby clams. These bacteria probably were initially present in the pack of canned baby clams because the cans examined were swollen after re-incubation.

The growth temperature of some species of bacteria was 55° C., whereas that of the other bacteria was both 37° and 55° C. This suggested that an incubation test at both 37° C. and at 55° C. will always be necessary for canned baby clams. The source of the bacteria is still unknown; however, seabottom mud where the baby clams are cultivated could be highly contaminated by bacteria.

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actomyosin when 5 percent sodium chloride is used. It is accompanied by the development of free fatty acids. Since the denaturation of protein in such fatty species as dogfish and mackerel is less than in the lean species, it is assumed that the protein is protected from FFA insolubilization by the neutral lipid within the cells. An esterification process for FFA in the fish muscle may also account for the protecting effect of the additional fat in fatty species against protein denaturation.

Protein-FFA binding may be the cause of lipid hydrolysis in the muscle of frozen fish. In cod, phosphatidyl ethanolamine and phosphatidyl choline hydrolyze rapidly at first; then, after 4 months, hydrolysis slows down or ceases. The ratio of palmitic to stearic acid in fatty fish is higher in the FFA than in the parent phospholipids. In dogfish, the ratio is the same in the FFA and the neutral lipids from which the FFA comes. Differences in fatty acid composition or possibly the localized occurrence of particular phospholipids may account for the cessation of hydrolysis in the phospholipids.

Thiobarbituric acid values were used as the rancidity index. In June and July, when muscle lipid in Newfoundland-caught cod averages 0.91 percent rather than the usual 0.63 percent, samples were particularly resistant to induced oxidation, whereas samples from later spawning cod with lower lipid averages showed no such resistance. The interaction of seasonal changes in muscle lipid and in the antioxidant tocopherol, which disappeared completely from most samples after only 4 months' frozen storage, was presumed. Samples that had been dipped in brine tended to have slightly higher tocopherol levels than did the samples dipped in fresh water, suggesting that sodium chloride may be a strong prooxidant. That such metabolic factors as amino acids may be involved in promoting oxidation was also suggested. [68 references]

4.13

from 0.57 to 0.74 percent, and oil content of livers from 15 to 75 percent. No definite seasonal variation was established, although it had previously been found that a maximum lipid content of cod occurred in July-September and a minimum in March-May. The highest values found in the present study were from the female cod caught in October 1963 and for the male cod caught in November 1963. Although these dates coincide with the maxima found for indices of overall condition and liver condition (K_p , K_L), the other monthly results were too variable to state that they represented seasonal maxima.

The seasonal changes in the fat content of livers were plotted. A definite increase occurred from May to June; a maximum was reached in October-November, and then the fat content sharply decreased as the gonads developed. The arithmetic mean in fat content for the year was 40 percent for the female cod and 35 percent for the male cod. Individual fish, however, showed wide variation from month to month. Generally the larger the fish was, the higher the fat content of the liver and the greater the ratio of liver weight to fish weight were.

Ahmad, K., and A. Rahman (University Dacca, Pakistan)
Chemical Abstracts 66, No. 19, 84867m (May 9, 1967)

CHOLESTEROL DISTRIBUTION IN FISH TISSUES

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The separation of commonly occurring saturated and unsaturated fatty acid methyl esters on silica gel chromatoplates treated with either dimethyldichlorosilane (DMCS) or diethyldichlorosilane (DECS) is described. Solvents used with the DMCS were either 10 percent aqueous methanol or water, methyl cyanide, methanol (2.5:2.5:95) both saturated with silver nitrate; solvents used with DECS were 10 percent aqueous acetone or water, nitromethane, methanol (2.5:2.5:95), both saturated with silver nitrate.

This method was applied to the separation of unsaturated glycerides, with a moderate degree of success. The degree of silanization of the chromatoplates was important to the successful separation of the glycerides, and was, in turn, dependent on the moisture content of the silica gel. In order to obtain reproducible results, the investigators activated the chromatoplates at 110° C. for 1 hr. and then cooled the plates over phosphorus pentoxide and equilibrated them for 24 hr. over a saturated aqueous solution of lithium chloride (relative humidity 15 percent) or calcium chloride (relative humidity 32 percent). Silanization was done for 1 hr. with DMCS or overnight with the less volatile DECS. The silanized chromatoplates were washed by developing with methanol to prevent the conversion of silver nitrate in the developing solvent into silver chloride. The plates were sprayed with ethanolic phosphomolybdic acid and heated at 140° C. for methyl esters and 260° C. for the glycerides. The separated compounds could then be detected.

<p>4.22 (*)</p> <p>HOMOGENEOUS CATALYSIS IN THE REACTIONS OF OLEFINIC SUBSTANCES. V - HYDROGENATION OF SOYBEAN OIL METHYL ESTER WITH TRIPHENYLPHOSPHINE AND TRIPHENYLARSINE PALLADIUM CATALYSTS</p> <p>Itatani, Hiroshi, and John C. Bailar, Jr. (William Albert Noyes Laboratory of Chemistry, University of Illinois, Urbana) Journal of the American Oil Chemists' Society <u>44</u>, No. 2, 147-151 (February 1967)</p> <p>The hydrogenation of vegetable oils has wide industrial application because it results in materials with new properties and increased values and uses. In a previous report (Bailar et al., 1965), hydridoplatinum complexes were described; mixtures of these complexes and tin(II) chloride were shown to be effective in the hydrogenation of soybean oil methyl ester. The methods of preparation of several palladium complexes containing triphenylphosphine or arsine are described. The hydrogenation of soybean oil methyl ester was conducted with these palladium complexes as catalysts, and the catalytic effects of such complexes are discussed. Some palladium complexes containing coordinated triphenylphosphine or arsine were effective and selective catalysts in the homogeneous hydrogenation of soybean oil methyl ester. The features characteristic of the process were (1) isomerization of <i>cis</i> double bonds to <i>trans</i> double bonds, (2) migration of isolated double bonds to form conjugated dienes, (3) selective hydrogenation of poly olefines to mono olefines without hydrogenation of mono olefine, (4) ester exchange of methyl ester to butyl ester, (5) effective hydrogenation and isomerization by methanol in the absence of elemental hydrogen.</p> <p>*Item on back of card. (over)</p> <p>COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 1 PAGE 13 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE</p> <p>ABSTRACTER: M. M. Gwin</p>	<p>5.7</p> <p>AUTOXIDATION OF TISSUE LIPIDS. I - INCORPORATION OF DIETARY FATTY ACIDS AND FORMATION OF MONOCARBONYL COMPOUNDS IN ADIPOSE TISSUE LIPIDS OF THE VITAMIN E-DEFICIENT RAT</p> <p>Derrick, Nancy M., and Lawrence A. Wishner (Department of Chemistry, Mary Washington College of the University of Virginia, Fredericksburg) Lipids <u>2</u>, No. 2, 133-136 (March 1967)</p> <p>Because of the empirical nature of the analyses on which the description is based, the term "peroxidation" is used in place of "autoxidation" when the phenomenon that occurs in vitamin E-deficient animal tissues is being described. The 2-thiobarbituric acid (TBA) test is the principal source of evidence and detects a number of unknown compounds that are related to classical autoxidation. Expressing the results of the TBA test in terms of malonaldehyde is a matter of convenience because other substances may be responsible and because malonaldehyde cannot be isolated from autoxidized methyl linoleate that has a significant TBA value. Studies have indicated that autoxidized methyl linoleate should not even show a TBA value. Despite these criticisms, the TBA test is reported to be of value in the assessment of the vitamin E status of tissues.</p> <p>A second source of evidence is peroxide determination, which is only slightly less empirical than the TBA test with respect to autoxidation. Several studies have shown that if air is excluded from the reaction, peroxides are not found in vitamin E-deficient tissues.</p> <p>(over)</p> <p>COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 1 PAGE 13 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE</p> <p>ABSTRACTER: M. F. Tripple</p>
<p>4.29 (*)</p> <p>COPOLYMERIZATIONS OF ESTERS AND GLYCERIDES OF UNSATURATED C18 FATTY ACIDS WITH ETHYL ACRYLATE AND ACRYLONITRILE</p> <p>Mayo, Frank R., and Constance Willard Gould (Stanford Research Institute, Menlo Park, California) Journal of the American Chemists' Society <u>44</u>, No. 3, 178-184 (March 1967)</p> <p>This work is a continuation of prior research (Mayo and Gould, 1964) on the copolymerization of styrene or acrylonitrile with the methyl esters of oleic, linoleic, conjugated linoleic, linolenic, and eleostearic acids with free radical initiators at 60°-130° C. Acrylonitrile has a greater tendency to copolymerize than does styrene, and conjugated methyl linoleate is more reactive than are the unconjugated esters. Therefore, copolymers are the hardest to make with styrene and unconjugated esters and are easiest to make with conjugated methyl linoleate and acrylonitrile. The preceding work also pointed out that methyl eleostearate, with three conjugated double bonds, inhibits the polymerization of both styrene and acrylonitrile. Because of lack of precedent for this observation and because conjugation of linseed oil acids would produce conjugated trienes (inhibitors), as well as dienes, the authors deemed it desirable to investigate the inhibiting or retarding properties of another conjugated triene.</p> <p>The present work extends the study on copolymerization with C-18 esters to ethyl acrylate; it shows that ethyl acrylate is intermediate between styrene and</p> <p>*Item on back of card. (over)</p> <p>COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 1 PAGE 13 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE</p> <p>ABSTRACTER: M. F. Tripple</p>	<p>6.37 (*)</p> <p>THERE'S AN ALGA IN MY SOUP</p> <p>Anonymous New Scientist <u>33</u>, No. 532, 270 (February 2, 1967)</p> <p>The French Petrol Institute is attempting to grow algae as a source of protein and vitamins. A large basin is used as a pilot station for the development of large-scale outdoor cultivating technology. The growing is done in fresh water with added mineral salts.</p> <p>Growth experiments have yielded about 40 to 45 tons per hectare (2.5 acres) a year for a growing period of 300 days under favorable climatic conditions. The dried blue-green alga was found to contain about 18 percent carbohydrates, 2 to 3 percent lipids, and appreciable quantities of vitamins, especially protein-vitamin A and vitamins B₁, B₂, B₁₂, and C. The most important feature of the alga, however, was that it contained about 62 to 65 percent protein. This high content of protein makes alga one of the richest sources of protein food known. These algal proteins were found to contain all the essential amino acids in quantities equal to or greater than those indicated in the standard established by the Food and Agriculture Organization, with the exception of sulfur-containing amino acids. The addition of the missing amino acids should make alga an excellent additive to unbalanced diets.</p> <p>*Items on back of card. (over)</p> <p>COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 1 PAGE 13 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE</p> <p>ABSTRACTER: M. M. Gwin</p>
<p>CATALYSTS IN OLEFIN HYDROGENATION</p> <p>COPOLYMERIZATION OF FATTY ACIDS</p>	<p>VITAMIN E REQUIREMENTS OF RAT</p> <p>ALGA AS FOOD</p>

4.29

acrylonitrile in its ability to enter copolymers. This work also shows that acrylonitrile can be copolymerized with linseed oil to give copolymers containing up to 87 percent by weight of oil. Some of the isolated copolymers have good drying and film-forming properties, but have rather low rates of conversion. All of the unsaturated C-18 esters, several glycerides with conjugated or unconjugated saturation, and 3,5,7-decatriene, as a model compound, are mild to strong retarders of polymerization of styrene, ethyl acrylate, and acrylonitrile; methyl sebastearate and decatriene are unusually strong retarders of polymerization. The retarding properties of the esters and glycerides are compared.

(10 references)

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A variety of palladium complexes showed decreases in catalytic activity in the following order: $(\phi_3P)_2PdCl_2 + SnCl_2 \cdot 2H_2O' > (\phi_3P)_2PdCl_2 + GeCl_2 > (\phi_3P)_2Pd(CN)_2 > (\phi_3As)_2Pd(CN)_2 > (\phi_3P)_2PdCl_2 >> (\phi_3As)_2PdCl_2$. Neither K_2PdCl_4 with $SnCl_2 \cdot 2H_2O$ nor $(\phi_3P)_2Pd(SCN)_2$ was effective for hydrogenation. Using a mixture of $(\phi_3P)_2PdCl_2$ and $SnCl_2 \cdot 2H_2O$, the hydrogenation and isomerization of soybean oil methyl ester was examined under various conditions. Using benzene and methanol as a solvent, the isomerization and hydrogenation of soybean oil methyl ester proceeded less effectively under nitrogen pressure than under hydrogen pressure.

The tissues from rats fed the vitamin E-deficient cod-liver oil feed yielded lipids with a lower iodine value, less polyunsaturated fatty acids, and more carbonyl compounds, particularly alkanals and alk-2-enals, than did the lipids from rats fed the vitamin E-supplemented diet. The tissues from rats fed the vitamin E-deficient corn oil diet contained less linoleate and more monocarbonyl compounds than did the tissues from rats fed the vitamin E-supplemented diet.

4.22 HYDROGENATION OF VARIOUS TYPES OF WHALE BLUBBER UNDER INDUSTRIAL CONDITIONS

4.29

Mori, Mikiyo, Takeo Horii, Takeo Fujita, Takashi Yamada, Yasuko Iwakiri, and
Ariksune Tanaka (Central Res. Lab., Nippon Suisan Co., Tokyo, Japan)
Chemical Abstracts 67, No. 4, 12822r (July 24, 1967)

UTILIZATION OF SPERM WHALE OIL.

XI - METHANOLYSIS OF SPERM WHALE OIL. 2.

Mori, Mikio, and Akio Ozawa (Central Res. Lab., Nippon Suisan Co., Tokyo, Japan) *Chemical Abstracts* 67, No. 4, 12825s (July 24, 1967)

4.22

EFFECT OF PROCESSING ON THE MICROFLORA OF NORWEGIAN SEAWEED MEAL, WITH OBSERVATIONS ON *SPORENDONEMA MINUTUM* (HØYE) FRANK AND HESS

Sieburth, John McN., and Arne Jensen (Norwegian Institute of Seaweed Research,
NTH Trondheim, Norway)

Applied Microbiology 15, No. 4, 830-838 (July 1967)

The brown alga *Ascophyllum nodosum* (L.) Le Jol. is used in Europe and Canada for the production of a seaweed meal that is used as an animal feed supplement. This seaweed meal is regarded as a good source of certain vitamins, minerals, and carotenoid pigments. In Norway, the seaweed meal is made exclusively from *A. nodosum*, usually by direct rotary drum-drying of the fresh alga. A very small part of the production is based on through-circulation drying of fresh seaweed in warm air. No visible development of molds or other microorganisms occurs during either drum drying or warm-air drying. A large amount of meal is also produced from seaweed that has been air dried on rocks, which in periods of variable weather can lead to leaching of the minerals, oxidation of the vitamins and pigments, and occasionally to a heavy overgrowth of molds or other microorganisms. Visible mold development can also occur on well-dried seaweed and high-quality seaweed meal when the water content of the material is allowed to increase to 25 percent or higher.

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UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: M. F. Tripple

STUDIES ON THE PRODUCTION OF BLACK PEARLS BY IRRADIATION WITH RADIOACTIVE-RAYS. I - CHANGES OF MANGANESE CONTENTS IN TISSUES OF PEARL OYSTERS CAUSED BY MANGANESE ADMINISTRATION

Horiguchi, Yoshishige, and Tadashi Tsujii (Faculty of Fisheries, Prefectural University of Mie, Tsu, Mie Prefecture, Japan), and Yaichiro Okada (Fisheries Research Laboratory, Tokai University, Shimizu, Shizuoka Prefecture, Japan) Bulletin of the Japanese Society of Scientific Fisheries 32, No. 11, 909-916 (November 1966) (In English)

This study was conducted to test the hypothesis that coloration of irradiated pearls may be the result of a colored material produced from a manganese compound in pearls. Three methods of administering manganese were used to find marine pearls containing large amounts of this metal: (1) the manganese chloride-sea water immersion method, (2) the manganese carbonate paste injection method, and (3) the manganese nucleus-insertion method. The changes of manganese content in various tissues of pearl oysters were investigated. It was estimated that the concentration of manganese in the oyster mantle necessary to obtain pearl oyster shell having the same amount of manganese as that of fresh-water mussels was about 135 to 610 γ per gram of dry mantle tissue. The manganese carbonate paste injection method of administering about 100 to 1,000 γ of manganese for 5 days and the manganese nucleus-insertion method of administering about 30 to 40 γ for 6 days proved to be the best methods for this type of study.

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UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: M. M. Gwin

EFFECT OF PROCESSING ON MICROFLORA OF SEAWEED MEAL

PRODUCING BLACK PEARLS BY IRRADIATION

7.0 FREEZE-DRYING FOR DETERMINING TOTAL SOLIDS IN SHELLFISH

Shaw, William N., Haskell S. Tubiash, and Allan M. Barker (U.S. Fish and Wildlife Service, Bureau of Commercial Fisheries Biological Laboratory, Oxford, Maryland) Journal of the Fisheries Research Board of Canada 24, No. 6, 1413-1417 (June 1967)

The customary method of measuring the condition of shellfish is by determining the percentage of solids. The percentage of solids is determined by the oven-dry technique in which the wet meat is weighed, and then the sample is oven dried at 50° C. for 24 hr. and at 90° C. for 24 hr. A principal source of inconsistency with this technique is the treatment of wet oyster meats prior to weighing. To eliminate error prior to weighing, the authors pry the oyster open at the hinge and shake out the free fluid; the adductor muscle is cut, and the meat and remaining liquor are placed in an evaporating dish. This report describes the freeze-dry technique for determining total solids in shellfish, compares this technique with the oven-dry method, and evaluates other methods of measuring the condition of shellfish.

A freeze drier is used to process all the oyster samples. Two accessories are used with the freeze drier: a lucite vacuum drier (20 in. by 12 in.) and a 3-tray heat rack, 19 in. by 9 in.).

The procedure is as follows: (1) wash oysters to remove mud and extraneous matter; (2) open oyster at the hinge (do not puncture meat or cut the adductor (over)

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ABSTRACTER: M. F. Tripple

METHOD FOR CALCULATING THE CALCIUM AND PHOSPHORUS IN MENHADEN FISH MEAL FROM THE ANALYSIS OF TOTAL ASH

Kurtzman, C. H., and M. E. Ambrose (Bureau of Commercial Fisheries Technological Laboratory, College Park, Maryland 20740) Poultry Science 46, No. 3, 718-726 (May 1967)

It is possible that in fish meals a close relation exists between the calcium and ash contents, and between the phosphorus and ash contents. If this relation holds true, then it would seem to be a good practice for manufacturers to use total ash as an index of the calcium and phosphorus content of fish meals. The specific objects of this study were (1) to obtain data on the calcium, phosphorus, and total ash contents of regular fish meal and to determine whether statistically significant relations exist between these contents; (2) if such relations do exist, to determine whether factors could be derived for calculating calcium and phosphorus content of regular fish meals from analyses of total ash; and (3) to determine whether factors can also be derived for calculating calcium and phosphorus content of fish meals containing added solubles.

Solubles can be added to press cake or dried scrap until the solubles constitute about 20 percent of the final dry weight of the mixture. Adequate sampling of the meals after each addition is difficult. Therefore, the problem of determining the contents of calcium and phosphorus in regular fish meals to which varying amounts of solubles had been added was approached by analyzing the regular (over)

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ABSTRACTER: M. F. Tripple

DETERMINING TOTAL SOLIDS IN SHELLFISH

CALCULATING CALCIUM AND PHOSPHORUS IN FISH MEAL

6.81

II - On the formation of manganese-rich marine pearls in pearl oysters.--Ibid.pp. 917-921. The formation of marine pearls containing large amounts of manganese and the relation between manganese content and degrees of coloration of irradiated pearl layers were studied. Using the manganous carbonate paste injection method with an injection of about 50 mg. anhydrous matter per shellfish, the contents of manganese in pearl layers of oysters rose to about 300 γ per gram within a period of 13 days. When the manganous carbonate-peanut oil paste was used, the manganese contents rose to about 40 to 67 γ per gram. It was found that the degrees of coloration of the pearl layer caused by γ -ray irradiation at a dose of 2×10^7 rads are proportional to the manganese contents of the layers.

III Relationship between the coloration obtained by γ -ray irradiation and the manganese contents in the shells of several shellfishes.--Ibid.pp. 5-11 (January 1967) To confirm the hypothesis that the coloration of irradiated pearls is due to coloration of manganese in the pearls, shells of nine species of fresh-water shellfish with varying contents of manganese were irradiated with γ -rays. Coloration of the shells of fresh-water and marine shellfish after irradiation was found to be proportional to the manganese compounds and to the amounts of iodine released. The colored material produced in the shells by irradiation remained stable for more than 16 months at room temperatures; however, at temperatures over 50° C. it became unstable and discolored.

6.37

Moldy materials are not tolerated as feed ingredients, so suitable methods for the detection and estimation of such contamination are needed. A number of saprophytic, parasitic, pathogenic, and symbiotic fungi have been reported for seaweeds, but the natural fungal flora has received little attention. Therefore, the purposes of the present study were to identify the principal fungi causing moldy seaweed, to develop media that would support these organisms and other members of the microflora, and to determine the effect of processing on the microflora of seaweed meal.

A cultural procedure was developed to enumerate the populations of bacteria, yeasts, and molds of seaweed meals manufactured by different drying processes. The microflora could be supported by a variety of media that varied in levels of nutrition and in the source and concentration of salts.

Fresh seaweed contained less than 10^3 bacteria and less than 10^2 yeasts and molds per gram dry weight. The type and extent of the microbial populations in seaweed meal were dependent on the method of drying. Rotary drum drying at temperatures decreasing from 800° to 80° C. maintained or reduced the microbial populations to 10^3 organisms per gram dry weight. Meals with high nutritional quality could be obtained with warm-air or rock-dried weed; however, these conditions also permitted development of bacteria and mold. Extended rock drying in variable weather conditions and prolonged storage of moist seaweed decreased the nutritional quality and led to high bacterial numbers and to a marked development of the halophilic brown mold *Sporodionema minutum*, which attained populations of 10^8 viable spores per gram of dried seaweed. A poultry diet that contained 5 percent badly molded seaweed had no apparent toxic or growth-depressing effect when it was fed to chickens. [22 references]

7.45

fish meal and the solubles separately. Data on the solubles, if different in calcium and phosphorus, can be used to adjust the data on regular fish meal for any amount of solubles added to make whole meal.

Twenty-nine menhaden fish meals containing no added solubles were analyzed for ash, calcium, and phosphorus content. A high degree of correlation was obtained between calcium and ash, and between phosphorus and ash. Calcium and/or phosphorus contents as a percent of total ash were quite consistent. Factors were derived and tabulated for use in calculating the amounts of calcium and phosphorus from an analysis of total ash.

The ash, calcium, and phosphorus contents of six samples of fish solubles were determined. Calcium in solubles was found to be less than in the regular meals. A different method for calculating calcium from ash was derived and tabulated for fish meals containing solubles. The phosphorus content of solubles was similar to that of fish meal and the factors for regular and whole meals were similar. Although the factors were tabulated, the effect of solubles on the phosphorus content was so slight as to be negligible.

Statistically derived high-, low-, and median-range values that were to be expected for calcium and phosphorus are presented. The limitations in accuracy of the calcium and phosphorus values obtained when using derived factors are discussed. It was the conclusion of the authors that the analysis of total ash content of menhaden fish meals can be used as a basis for determining the calcium and phosphorus contents within prescribed limits of accuracy.

7.0

muscle); (3) shake oyster to drain shell-cavity fluids; (4) cut adductor muscle and place oyster and fluids in a preweighed evaporating dish; weigh dish and meat to the nearest centigram; (5) place dish in freezer until meats are solidly frozen; (6) transfer frozen oysters to freeze-drier drum and process for 12 hr.; and (7) immediately weigh to the nearest centigram. For a composite analysis, follow Steps 1-3, then place desired number of oysters in a blender and grind at high speed for 2 min. Place about 20 grams of blended meats in an evaporating dish and weigh. Continue the composite analysis by following Steps 5-7. Content of solids is calculated by the following: Percent solids = $\frac{\text{dry weight of meat (grams)}}{\text{wet weight of meat (grams)}} \times 100$

When duplicate samples were processed by the freeze-dry and oven-dry techniques, the difference between oyster samples was consistent; the percentage of solids for freeze-dried oysters was slightly higher and the average difference was 0.3. The lower percentage of solids for oven-dried oysters indicated that either volatile substances other than water were being removed by oven drying or a small quantity of water was being retained in the freeze-dried meats. Percentage of solids is probably the most common laboratory method of measuring the condition of shellfish meats and percentage of solids is easier to measure with the freeze-dried method. Determination of solids is refined when the freeze-dry technique is used, processing time is reduced from 40 to 12 hr., unpleasant odors are eliminated, and meats can be weighed immediately after freeze drying. With a 3-tray rack, 20 samples can be processed at one time. The cost of freeze-drying equipment is compensated for by saving of time and ease of processing. [12 references]

7.51	<p>PROTEIN IN EXTRACTS OF PRERIGOR AND POSTRIGOR SCALLOP STRIATED MUSCLE</p> <p>Matsumoto, J. J. (Sophia University, Tokyo, Japan), W. J. Dyer, J. R. Dingle, and D. G. Ellis (Fisheries Research Board of Canada Halifax Laboratory, Halifax, Nova Scotia)</p> <p>Journal of the Fisheries Research Board of Canada <u>24</u>, No. 4, 873-882 (April 1967)</p> <p>In contrast with fishes' and higher vertebrates', the muscle of some marine invertebrates is characterized by an abundance of a protein called tropomyosin A or paramyosin. The role of this protein in the mechanism of adductor muscles of invertebrates has been the subject of recent interest. Various Japanese workers have investigated the nature of "myosin B" extracts from the scallop <i>Pecten yessoensis</i> and other marine animals. The unusual extraction with water of protein with contractile properties from the mantle muscle of squid has been observed. Differences in the ease of extraction of paramyosin from mollusks and from vertebrates indicates that the muscle structure of lower marine animals may differ from that of mammals, upon which most of the investigations have been carried out. The increased importance of the scallop fishery on the Northwest Atlantic banks in recent years has stimulated interest in basic knowledge of the edible muscle of the scallop <i>Placopecten magellanicus</i>. This study deals with the extractability of the proteins from the striated portion of the adductor muscle of this scallop.</p> <p>(over)</p>	<p>7.84</p> <p>ENZYMATIC IDENTIFICATION OF FISH PRODUCTS</p> <p>Wilson, A. C. (Graduate Department of Biochemistry, Brandeis University, Waltham, Massachusetts), G. B. Kitto (Department of Chemistry, University of Texas, Austin), and N. O. Kaplan (Graduate Department of Biochemistry, Brandeis University, Waltham, Massachusetts)</p> <p>Science <u>157</u>, No. 3784, 82-83 (July 7, 1967)</p> <p>In 1960 and again in 1965, the authors examined the properties of lactate dehydrogenases in gadoid fishes. During one phase of the study (which was followed up by collaboration with other investigators), they subjected commercial samples of frozen fillets labeled "haddock" to starch-gel electrophoresis. To their surprise, they found that the lactate dehydrogenase of the "haddock" was electrophoretically identical to that of cod but distinctly different from that of true haddock. Continuing the tests, they found that this instance of mislabeling was not isolated.</p> <p>In extension of the study, they examined the mobility--that is, the distance the major form of lactate dehydrogenase in a muscle extract would move toward the anode--and the thermostability of muscle lactate dehydrogenases from various species of fish. They found that the lactate dehydrogenase of species belonging to the same genus (for example, bluefin and yellowfin tuna) had the same mobility. In contrast, the lactate dehydrogenase of more distantly related species (for example, cod and haddock, or halibut and sole) differed. In addition, the lactate</p> <p>(over)</p>
7.67	<p>IDENTIFICATION AND ESTIMATION OF TOCOPHEROLS BY GAS-LIQUID CHROMATOGRAPHY</p> <p>Slover, Hal T., Lydia M. Shelley, and Teman L. Burks (Human Nutrition Research Division, U.S. Department of Agriculture, Agricultural Research Service, Beltsville, Maryland)</p> <p>Journal of the American Oil Chemists' Society <u>44</u>, No. 3, 161-166 (March 1967)</p> <p>This work was undertaken to develop a specific assay suitable for routine analysis for the individual tocopherols in wheat. The chromatographic separation of free tocopherols on Apiezon L was not successful because of variable sample loss on the column and tailing peaks. The trimethylsilyl (TMS) ethers prepared by the method of Sweeley et al. (1963) proved to be more satisfactory for the separation. The choice of stationary phases was necessarily limited to those that were stable at high temperatures and was further restricted to those that gave at least a partial separation of β and γ. There was no available stationary phase more polar than columns of SE-30 that met these criteria.</p> <p>A gas chromatographic method is described that was used for the identification and estimation of the individual tocopherols as their TMS ethers. The TMS ethers were prepared by dissolving the sample in a mixture of hexamethyl disilazane, trimethylchlorosilane, and anhydrous pyridine (2:1:10). The mixture was allowed to stand for at least 15 min. Separations were made at 235° C. on 0.08-inch I.D. x 15-foot silanized glass columns packed with either 0.5 percent Apiezon</p> <p>*Item on back of card.</p>	<p>COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 1 PAGE 17 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE</p> <p>ABSTRACTER: M. F. Tripple</p>
9.15	<p>STUDIES ON EFFECTS OF FOREST SPRAYINGS WITH INSECTICIDES, 1952-1963, ON FISH AND AQUATIC INVERTEBRATES IN NEW BRUNSWICK STREAMS: INTRODUCTION AND SUMMARY</p> <p>Kerswill, C. J. (Fisheries Research Board of Canada Biological Station, St. Andrews, New Brunswick)</p> <p>Journal of the Fisheries Research Board of Canada <u>24</u>, No. 4, 701-708 (April 1967)</p> <p>This introduction to a series of fisheries studies associated with the operational and experimental forest sprayings of DDT (dichlorodiphenyltrichloroethane) mixed with oil outlines the following: (1) the history of the spray program developed to counteract an outbreak of the spruce budworm (<i>Choristoneura fumiferana</i>) in New Brunswick; (2) the administrative arrangements for developing and coordinating a research and management program concerning the affected fisheries, particularly the Atlantic salmon (<i>Salmo salar</i>) fisheries; (3) the results of field and laboratory studies on the effects of insecticide sprayings on caged young salmon and trout (<i>Salvelinus fontinalis</i>), on aquatic insect production, on feeding habits of native young salmon, and on population levels of young salmon.</p> <p>Aerial spraying with DDT-in-oil to deposit $\frac{1}{2}$ lb. of DDT per acre of forest occasionally caused extensive losses of young wild Atlantic salmon and other fishes for several days after extensive spray coverage of the watershed. Annual population assessments of the three size-classes of young salmon common to New Brunswick streams (underyearlings, small parr, and large parr) with and without spray treatments showed the following reductions in abundance after spraying DDT</p> <p>(over)</p>	<p>COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 1 PAGE 17 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE</p> <p>ABSTRACTER: M. F. Tripple</p>
9.17	<p>EFFECTS OF INSECTICIDES ON FISH AND AQUATIC INSECTS</p>	

7.67

L or 2 percent SE-30 on 110/120 mesh Anakrom (acid and base washed and silanized).

The retention data, obtained either by chromatographing known compounds or by prediction using the Kovats Retention Indices, are presented for tocol, tocotrienol, and all 14 possible methylated tocols and tocotrienols. The quantitative results from the analyses of two standard mixtures are presented. Application of the method to naturally occurring tocopherols is illustrated by chromatograms of partially purified fractions from soy oil, wheat germ oil, whole wheat flour, and corn meal.

The end point of the method is dependent on pH because the pH range is from 0.5-5.0.

7.461
POTENTIOMETRIC DETERMINATION OF SALT IN FOODSTUFFS
Cole, S. J. (Australasian Food Research Laboratories, Cooranbong, New South Wales, Australia)
Food Technology 21, No. 3, 84-86 (March 1967)

A rapid method has been developed for determining salt as chloride in food materials. The method is based on the potentiometric titration of chloride with silver nitrate; a silver-silver chloride electrode is the indicator. The results obtained are more reproducible and give slightly higher recoveries than do the official methods of analysis now in use. The extraction time for chloride is less than 5 min. Although fluoride or phosphate do not interfere quantitatively with the method, bromide, iodide, and sulfur-containing amino acids do. However, no difficulties should arise at the levels these compounds are found in most foods.

7.51 (Cross reference: 1.84)

Material extracted up to $\Gamma/2 = 0.25$ was presumably composed of sarcoplasmic proteins, and amounted to 20 percent of the total protein. A maximum of 99 percent of the total protein was reached at $\Gamma/2 = 0.35-0.40$, and at $\Gamma/2 = 1.5$. The character of the residue after centrifugation varied with the extracting solution. At $\Gamma/2 = 0-0.20$, and $0.35-0.60$, the residue was well packed and the supernatant readily separated. At $\Gamma/2 = 0.25-0.30$, the residue occupied the larger part of the mixture. At $\Gamma/2 = 0.80$, separation was poor. Separation improved at higher salt concentrations. The maximum of the actomyosin fraction coincided with the maximum of extraction at $\Gamma/2 = 0.35$, and apart from an anomaly at 0.80 , the amount of the fraction gradually decreased up to $\Gamma/2 = 1.5$.

Extraction of prerigor scallop muscle gave a large yield of 76 percent of the total protein at $\Gamma/2 = 0.10$, with a maximum extraction of 92 percent at $\Gamma/2 = 0.30$. The extract with water was not viscous and did not show a double refraction of flow, but extractions beyond $\Gamma/2 = 0.10$ showed marked double refraction of flow and were viscous between $0.15-0.60$. After standing overnight at 0°C , a considerable amount of protein precipitated from some of the extracts. The prerigor and postrigor extracts made under these conditions appeared to be similar.

The nature of the prerigor extracts was studied by analytical ultracentrifugation. Sedimentation patterns of extracts made at $\Gamma/2 = 0.4$ and 0.6 showed the presence of four components. The patterns of these components were similar to those for cod muscle. In an extract made at $\Gamma/2 = 0.15$, only small amounts of two components were detected. The bulk of protein was presumably present as suspended particles that were rapidly removed by ultracentrifugation. [19 references]

DETERMINATION OF SALT IN FOODS

9.15

at $\frac{1}{2}$ lb. per acre; underyearlings 90-98 percent, small parr 70 percent, and large parr 50 percent. Reductions after spraying DDT at $\frac{1}{2}$ lb. per acre were underyearlings 50 percent, small parr 20 percent, and large parr 0 percent; DDT applied twice at $\frac{1}{2}$ lb. per acre caused a 90-98 percent reduction in underyearlings, which was the same as for a single application of DDT at $\frac{1}{2}$ lb. per acre.

Young salmon and trout held in cages in streams in the lower part of sprayed watersheds suffered high mortality within 3 weeks of spraying with DDT at $\frac{1}{2}$ lb. per acre; spraying with DDT at $\frac{1}{2}$ lb. per acre had less serious effects.

Aquatic insects of streams affected by spraying underwent a general cessation of emergence for a 3- to 6-week period after spraying; various insect groups then recovered at different rates. Chironomidae (midges) recovered by late summer of the spray year, but the larger insects returned more slowly. In some cases, postspray total numbers of emerging insects exceeded prespray numbers, but the corresponding volume was lower than the prespray volume. Analysis of stomach contents of young salmon showed that after DDT spraying the diet changed with the change in availability of aquatic insects that normally constitute the diet of young salmon.

Adult stocks of Atlantic salmon that were derived from year-classes of young affected by spraying declined in quantity. Declines in catches were related to spraying in the preceding years. An upsurge in catches in 1963 appeared to be associated with the absence of spraying in 1959 and with the presence of other conditions favorable to salmon survival. [20 references]

7.84

dehydrogenase in haddock muscle was rapidly inactivated at 46°C , whereas that of commercial "haddock" and cod remained stable at that temperature. Figures for mobility and thermostability in 19 teleosts and 8 nonteleosts are tabulated.

In a later experiment, they made crystalline preparations of lactate dehydrogenases from cod and haddock, produced antisera to the enzymes in rabbits, and attempted to distinguish between the two types of enzymes by the immunological method of quantitative microcomplement fixation. The results showed that the antiserum directed against the lactate dehydrogenase of haddock muscle reacted less strongly with the enzyme from cod muscle than it did with the haddock enzyme; the opposite reaction occurred with the antiserum directed against the lactate dehydrogenase of cod muscle.

The authors recognize that their technique for distinguishing between cod and haddock requires expensive equipment and trained personnel. However, they note that Levine and Weston have developed a relatively cheap, quick immunological procedure that is similar to those used for typing blood or determining pregnancy. They point out that the use of enzymatic properties for identifying species is not applicable only to fish products or to single enzymes. Such enzymes are present for example, in pork, beef, lamb, chicken, and turkey. Enzymological analysis, then, should be valuable as a means of detecting mislabeling of meats or of determining whether one type of meat has been contaminated with another. [15 references]

<p>9.15 FISH LOSSES AFTER FOREST SPRAYING WITH INSECTICIDES IN NEW BRUNSWICK, 1952-62, AS SHOWN BY CAGED SPECIMENS AND OTHER OBSERVATIONS</p> <p>Kerswill, C. J. (Fisheries Research Board of Canada Biological Station, St. Andrews, New Brunswick), and H. E. Edwards (Resources Development Service, Department of Fisheries of Canada, Halifax, Nova Scotia)</p> <p>Journal of the Fisheries Research Board of Canada <u>24</u>, No. 4, 709-729 (April 1967)</p> <p>Aerial spraying to control the spruce budworm (<i>Choristoneura fumiferana</i>) in spruce and fir forests in New Brunswick was begun in 1952. By 1957, the outbreak of spruce budworm had spread over the central part of the Province and spraying was begun over 37 percent of the total forest area of New Brunswick. The outbreak later subsided, but chemical control was still necessary to contain the budworms in the central region.</p> <p>The areas sprayed always included one or more rivers containing Atlantic salmon (<i>Salmo salar</i>), and the agencies responsible for fisheries were concerned about the effects of insecticides on fish production. Beginning in 1952, the effects of spraying on the rivers were studied. Effects of both the insecticides and methods of application on budworms and fishes were observed. This paper describes the observations on fishes during systematic stream and lake patrols, and observations on young salmon and trout held in cages and above barriers inside and outside the spray areas, as well as miscellaneous observations related to the</p> <p>(over)</p> <p>COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 1 PAGE 19 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE</p> <p>ABSTRACTER: M. F. Tripple</p>	<p>9.15 EFFECTS OF FOREST SPRAYING WITH DDT ON AQUATIC INSECTS OF SALMON STREAMS IN NEW BRUNSWICK</p> <p>Ide, F. P. (Department of Zoology, University of Toronto, Toronto, Ontario)</p> <p>Journal of the Fisheries Research Board of Canada <u>24</u>, No. 4, 769-805 (April 1967)</p> <p>Aerial spraying of large tracts of forest in New Brunswick with DDT (dichlorodiphenyltrichloroethane) was carried out from 1952 to 1962, with the exception of 1959, to control an outbreak of the spruce budworm. The Miramichi River, in the sprayed area, is one of the most important salmon rivers in eastern Canada and, as such, it was selected as the site of long-term investigations of the causes of variation in salmon populations. As part of this program, an investigation was begun on the effects of spraying on food organisms in the streams, particularly on the aquatic insects that are an important component of the diet of young salmon. A cursory survey of sprayed and unsprayed streams in the Miramichi River system was made about a month after spraying in 1954. Major differences were seen between comparable sections of the sprayed and unsprayed streams. Subsequent examinations indicated that many insects had survived the spraying, some in the egg stage, some as pupae, and a few of the more tolerant species as nymphs and larvae. Intensive sampling of the aquatic insects in sprayed and unsprayed streams of the river system was begun in 1955 and continued each summer until 1962.</p> <p>The emerging aquatic insects were sampled on a 24-hour basis using cage traps. The sampled insects showed the effects on the stream fauna of spraying forests in</p> <p>(over)</p> <p>COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 1 PAGE 19 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE</p> <p>ABSTRACTER: M. F. Tripple</p>
<p>9.15 FISH LOSSES AFTER INSECTICIDE SPRAYING</p> <p>EFFECTS OF DDT SPRAYING ON AQUATIC INSECTS</p>	<p>9.15 FISH LOSSES AFTER INSECTICIDE SPRAYING</p> <p>EFFECTS OF DDT SPRAYING ON AQUATIC INSECTS</p>

<p>9.19 CAESIUM-137 IN EDIBLE FRESHWATER FISH</p> <p>Gustafson, P. F., S. S. Brar, and S. E. Muniak (Division of Biological and Medical Research, Argonne National Laboratory, Argonne, Illinois)</p> <p>Nature <u>211</u>, No. 5051, 843-844 (August 20, 1966)</p> <p>Three factors determine the concentration of cesium-137 present in fish: (1) the concentration of this radionuclide in the aquatic environment; (2) the ratio of cesium-137 to potassium in the water; and (3) the level of the fish in the aquatic food chain. The accompanying table presents data on the concentration of cesium-137 and potassium in commercially available fresh- and salt-water fish purchased in Chicago between January and April 1965.</p> <p>The concentration of potassium in both fresh- and salt-water fish was on a similar level, but the level of concentration of cesium-137 in fresh-water fish was considerably higher than the level in marine fish was. The authors believed this was due to a much higher ratio of cesium-137 to potassium in fresh-water than in the ocean. As indicated in the table, the position of the fish in the aquatic food chain had a bearing on the fish's cesium-137 content. The carnivorous fish showed the highest concentrations of cesium-137.</p> <p>(over)</p> <p>COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 1 PAGE 19 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE</p> <p>ABSTRACTER: E. R. Weissman</p>	<p>9.7 A NATIONAL TRAINING SYSTEM</p> <p>Keene, S. G. (Nautical Department, Grimsby College of Technology, Grimsby, England)</p> <p>World Fishing <u>16</u>, No. 3, 53-54 (March 1967)</p> <p>The purpose of a training program for any industry should be to impart skills and knowledge so that work in that industry is carried out at the highest level of efficiency, with least waste of material, greatest saving of time, maximum level of production, and due regard to the protection of property and the safety of personnel. In modern industry, the individual is expected to have personal responsibility for his job, possess the facts and experience related to his function in the enterprise, and have a broad knowledge of the overall operation. It is also assumed that a man earning his living is entitled to receive satisfaction and adequate reward for his contribution to the industry. All these factors also apply to the fishing industry.</p> <p>Catching fish in the present age of technology is a complicated business that requires a high level of operative skill and knowledge and an understanding of modern technologies as applied to fishing vessels. Fishing vessels are getting larger and are at sea for longer periods of time. This enlargement increases the complexity of the vessel and the equipment on board and, in turn, imposes a greater strain on the members of the crew, who are directly responsible for the success of the trip. The contribution of the crew to the success of a fishing trip points out the need for adequate education and training.</p> <p>(over)</p> <p>COMMERCIAL FISHERIES ABSTRACTS VOL. 21 NO. 1 PAGE 19 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE</p> <p>ABSTRACTER: M. F. Tripple</p>
<p>9.7 CESIUM 137 IN FISH</p> <p>TRAINING SYSTEM FOR FISHERMEN</p>	<p>9.7 CESIUM 137 IN FISH</p> <p>TRAINING SYSTEM FOR FISHERMEN</p>

June with DDT at ½ pound per acre. Except for a few individual insects that presumably emerged from unaffected pupae and nymphs, there was an interval of several weeks after spraying when no emergence occurred. After the middle of August, large populations of very small insects, mainly chironomids, emerged in the same year the spray was applied. The year after spraying, as compared with the spray year, an increased variety of insects emerged, including some larger species.

In the following years further recovery occurred with an increase in larger insects through reproduction from residual small populations. The caddisflies were the slowest group to recover. After a single application of DDT, it usually took 4 or more years for the caddisflies to recover quantitatively, whereas a similar spray of the insect fauna recovered quantitatively in 2 to 3 years. When a similar spray was applied again, a reduction occurred within 3 years that was equal in severity to that following the original spraying.

From the standpoint of feed for the young salmon, the significant facts are as follows: (1) the severe reduction in the bottom fauna of larvae and nymphs of all sizes in the first weeks after spraying; (2) the large populations of small larvae, mainly chironomids, developing in late summer of the spray year and thus becoming available to the fry; and (3) the increasing numbers of larger insects emerging the year after spraying and in subsequent years. [20 references]

spraying program that were made at a salmon counting fence on the Northwest Miramichi River and at other locations.

The survival of young Atlantic salmon and eastern brook trout, held in cages and free living, was observed in New Brunswick streams inside and outside forested areas that were sprayed from aircraft with DDT (dichlorodiphenyltrichloroethane) and other insecticides. A single application of DDT-in-oil at a concentration of ½ pound per acre resulted in a heavy loss of underyearling salmon and parr within 3 weeks after spraying. DDT-in-oil applied at ½ lb. per acre had no apparent short-term effects on salmon parr; however, this application killed many under-yearlings. Two applications 10 days apart of DDT-in-oil at ½ lb. per acre were as harmful as a single application of DDT at ½ lb. per acre. DDD (dichlorodiphenyl-dichloroethane) at ½ and ½ lb. per acre, and malathion at 1/8 lb. per acre were no more harmful to young salmon than was DDT at ½ lb. per acre. Replacing the original airplanes with larger aircraft and associated changes in spraying procedure occasionally caused heavy fish losses even from single applications of DDT at ½ lb. per acre. Experimental spraying of phosphamidon-in-water at 1 lb. per acre did not have any apparent harmful effects on young salmon and trout.

Observations at a counting fence across the Northwest Miramichi River 12 miles below the lower boundary of the forested area sprayed with DDT at ½ lb. per acre showed extensive mortality of sucker and cyprinids. The numbers of these species moving through the fence were abnormally low for several years after the spraying.

Following the June sprayings of watersheds with DDT, dead wild young salmon were found in streams when the autumn water temperatures approached freezing. This observation lead to the conclusion that DDT spraying can have important delayed effects on young salmon populations, and these effects could be easily overlooked. [10 references]

The owners of trawlers are quick to incorporate the latest equipment to increase the efficiency of their vessels. This equipment includes sophisticated propulsion arrangements and electronic devices for navigation, ship safety, and fish finding. A comparable installation ashore would be run by a highly qualified team of managers, engineers, and operatives. Land-based industry makes certain this is the case by having national qualifications that are used by industry at all levels of employment.

There is no comparable application of this principle to the fishing industry. The only system of certification that tests the competence of fishermen is the Skippers and Masters Certificates, which are a form of "driving license" and in no way test the ability of the candidate as a fisherman or manager. Land-based industries make sure that people in responsible positions possess the professional knowledge, experience, and ability to do an expert job. The fishing industry may be the only industry in which a man of ability must haul himself up by his own bootstraps. Successful fishermen learn by practice and observation, but the top fishermen do not always have the confidence and assurance that comes from professional knowledge gained by modern education and training systems.

The author advocates for the fishing industry a national system of technical education and training that is patterned after systems for other industries. Syllabuses and other relevant matters would be decided by a national board consisting of representatives of all interested parties. The author presents his plan for certificates, relevant syllabuses, and courses.

CESIUM-137 AND POTASSIUM IN SALT- AND FRESH-WATER FISH

Fish	Feeds on	Cesium-137 (pc./kg. wet wt.)	Potassium (g./kg. wet wt.)	Cesium-137 (pc./g K)
Fresh-water				
Lake trout	smaller fish & animals	2,210	2.49	887
Lake trout	do.	3,874	3.50	1,107
Lake trout	do.	2,923	2.90	1,008
Pike	do.	2,610	3.58	729
Pike	do.	1,428	3.25	439
Pike	do.	1,167	2.47	472
Pike	plankton	1,316	3.57	369
Whitefish	do.	328	3.51	93
Whitefish	do.	265	3.65	73
Lake perch	do.	365	2.89	126
Lake perch	do.	330	2.96	111
Smelt	do.	327	2.60	126
Smelt	do.	377	3.17	119
Salt-water				
Halibut	smaller fish & animals	62	5.26	11.8
Salmon	do.	71	3.51	20.2
Red snapper	do.	12	1.76	6.8
Ocean perch	plankton, annelids	32	3.08	10.4
Ocean perch	do.	56	3.11	16.0
Flounder	mollusks, etc.	24	2.88	8.3

MECHANISMS OF ORGANIC OXIDATION AND REDUCTION BY METAL COMPLEXES

Kochi, Jay K. (Case Institute of Technology, Cleveland, Ohio)
Science 155, No. 3761, 415-424 (January 27, 1967)

The mechanism of various organic oxidation and reduction reactions depends on the formation and reaction of free radicals with metal complexes. Oxidation and reduction are also involved in redox (trace-metal) catalysis. The oxidation and reduction of free radicals with metal complexes follow two general mechanisms: electron transfer and ligand transfer. In the electron transfer, or outer sphere-mechanism, the redox process occurs largely by transfer of an electron from reductant to oxidant, with only indirect contributions from the solvent and ligand. Ligand transfer, or inner-sphere mechanism, requires complete involvement of the ligand in the transition state. The two mechanisms are discussed in detail in the article. This article presents only an introduction to the area of chemical research to be done on oxidation-reduction mechanisms, reactions, and catalysis. [41 references]

[Abstracted: M. M. Gwin]

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MEMBRANE STRUCTURE AND ION PERMEATION

Eisenman, G., J. P. Sandblom, and J. L. Walker, Jr.
Science 155, No. 3765, 965-974 (February 24, 1967)

The relation between membrane structure and membrane permeation by ions are discussed in this article. With the increasingly diverse types of ion-exchange membranes available through recent progress in chemistry, the effects of membrane structure on membrane properties are becoming better understood. An understanding is relevant to the development of physical explanations for the bioelectric and ion-transport properties of living membranes, which is the subject of interest. Despite increasingly broad and detailed descriptions of biological ionic permeability and membrane structure, the physical mechanisms by which ions cross such membranes are not known and are the subject of diverse speculations. This article discusses classification of membranes, theoretical approaches, distinguishing features of ion permeation in various systems, and structure and ion permeation in biological membranes. [95 references] [Abstract: M.F. Trippl]

*Items on back of card.

0.35 SEPARATION OF SUBCELLULAR PARTICLES

Mathias, A. P. (Univ. Coll. London, England) Chemical Abstracts 65, 2599e (July 18, 1966)

EFFECT OF MONOSODIUM GLUTAMATE ON CANNED TUNA

Piratti, Duilio (Stazione Sper. Ind. Conserve Aliment., Italy)
Chemical Abstracts 66, No. 5, 18047c (January 30, 1967)

*Items on back of card.

THE POSSIBILITY OF AND RISKS IN THE USE OF ANTIBIOTICS
(PARTICULARLY THE TETRACYCLINES) FOR MEAT PRESERVATION
UNDER TROPICAL CONDITIONS

Barnes, E. M., and E. H. Kampel Macher
Proc. 1st Congr. Int. Inds. Aliment. Agric., Abidjan pp. 1093-1106 (December 1964)
Abstracts from Current Scientific and Technical Literature 19, Abstract No. 2753,
p. 517 (December 1966)

The World Health Organization has recommended that field trials be carried out with antibiotics that will be used for preservation of meat in tropical and subtropical countries where refrigeration is lacking. In proposals outlined for additional trials, especially with cattle, microbiological tests will be made to ensure that the use of tetracyclines does not increase hazards from pathogenic bacteria on the carcasses.

2.3 SKINNING KNIVES

British Patent 1,047,168
Abstracts from Current Scientific and Technical Literature 20, Abstract No. 189,
p. 36 (January 1967)

A skinning knife with a motor-operated reciprocable blade that is guided between two adjustable toothed side guards of a blade protector, in which the blade is 40.7 mm. thick and the slot between the side guards is 40.99 mm. wide is described.

*Items on back of card.

SKINNING KNIVES

British Patent 1,046,945
Abstracts from Current Scientific and Technical Literature 20, Abstract No. 185,
p. 35 (January 1967)

A skinning knife with a motor-operated reciprocable blade that is guided between two side guards of an adjustable and removable blade protector, in which the blade is reciprocated and guided by a pendulum suspension in such a way that the movements of the cutting edge are planar and oscillatory in relation to the side guards is described.

Boychok, Sherman (Columbia University, New York, New York)
Science 154, No. 3754, 1288-1299 (December 9, 1966)

Circular dichroism is the unequal absorption of right and left circularly polarized light and is a manifestation of optical activity in the vicinity of absorption bands. To scientists interested in the conformation of macromolecules and in the sensitive response of optical activity to conformational alteration, circular dichroism offers a new and powerful means of understanding the environment of chromophoric residues. As a tool in the elucidation of electronic spectra, circular dichroism should be useful to the theoretical scientist in identifying weakly allowed absorption bands, as well as in providing rotational parameters comparable to others associated with the developing theory of optical activity. The application of the principles of circular dichroism to the experimental aspects of proteins and nucleic acids in solution is stressed. Many of the particular quantitative details are still uncertain. However, early results are yielding new information on the conformation of these molecules. [51 references]

[Abstracter: M. F. Tripple]

[51, references]

Roubal, William Theodore (Univ. of California, Davis)
Chemical Abstracts 65, 4153g (August 1, 1966)

0.35 LIPID PEROXIDATION DAMAGE TO BIOLOGICAL MATERIALS

0.30 A GROUP OF FATTY ACIDS WITH TETRAMETHYLENE-INTERRUPTION IN THE DOUBLE BOND SYSTEM

Gollerman, J., and H. Schlenk
Experientia 19, 522-523 (1963)

Annual Report of the Hormel Institute, 1963-1964, p. 30 (University of Minnesota, Minneapolis)

The leaves and nuts of *Ginkgo biloba* contain several unsaturated fatty acids whose structure does not follow the usual principle of methylene-interruption of the double bonds. The acids, 5,11,14-20:3, 5,11,14,17-20:4, and others, were isolated and identified, along with polyunsaturated acids of common double-bond structure. It was characteristic for the unusual structures to have one double bond in position 5 and the double bond closest to it to be in position 11, not 8. Additional bonds were found in positions 14 and 17. Desaturation in position 5 was found to be wider spread than was formerly assumed, occurring in reference to the carboxyl group rather than to other double bonds that were present in the molecule.

0.35 SPONTANEOUS DEGRADATION OF A TRITIATED GLYCERYL ETHER

Haatch, W. Geoffrey, and Donald J. Hanahan (Univ. of Washington, Seattle) Chemical Abstracts 63, 8652d (September 27, 1965)

CHEMISTRY AND BIOCHEMISTRY

CHEMISTRY AND BIOCHEMISTRY

PRESERVATIVES

HANDLING FRESH FISH

PRELIMINARY PROCESS DESIGN AND TREATABILITY STUDIES OF FISH PROCESSING WASTES

Ratusky, I., J. P. Lawler, T. P. Quirk, and E. J. Ganettell (Rutgers State University, New Brunswick, New Jersey)
Chemical Abstracts **66**, No. 6, 21987e (February 6, 1967)

2.3 STERILIZATION BY ELECTROHYDRAULIC TREATMENT

2.3

Allen, Merton (Chemical Systems Branch, General Electric Company, Schenectady, New York), and Kenneth Soike (Department of Microbiology, Albany Medical College, Albany, New York)
Science 154, No. 3745, 155-157 (October 7, 1966)

An electrohydraulic treatment applied to suspensions of *Escheria coli*, spores of *Bacillus subtilis* var. *niger*, *Saccharomyces cerevisiae*, bacteriophage T-2, and raw municipal sewage sterilized all the suspensions. Data are presented to show the varying degrees of treatment required for the sterilization of each micro-organism. [Abstract: M. F. Tripple]

[Abstracter: M. F. Tripple]

3.12 BEHAVIOR AND EFFECT OF SOME PRESERVATIVES IN FISH PRODUCTS.

III - ANTIBACTERIAL ACTIVITY OF TYLOSIN ADSORBED BY FISH MEAT

Yokosaki, Meonobu, Chieko Nemoto, and Keisshi Amano (Tokai Regional Fisheries Res. Lab., Tokyo, Japan)
Chemical Abstracts 66, No. 25, 114714d (June 19, 1967)

framide and tylosine for use in human food,]
[Abstract: M. M. Qwin]

3.12

STUDIES ON KEEPING FRESHNESS OF RAW FISH AND SHELLFISH.
 III - ICING WITH FURYLFRAMIDE, CHLORTETRACYCLINE, AND
 TYLOSINE AS FOR PRESERVING CHUM SALMON INTENDED FOR CANNING.

Akiba, Minoru, Terushige Motohiro, Michiaki Suzuki, and Satoru Nagadoi
Bulletin of the Faculty of Fisheries Hokkaido University 17, No. 2, 110-116
(August 1966)

The effect of preserving chum salmon by icing with furylformide, chlortetracycline, and tylosine was determined. The preservation effect of icing with furylformide and tylosine was almost the same as the effect of icing with chlortetracycline. Lengthening the iced storage period resulted in belly burn of the salmon, which lowered the quality of the canned product. Pretreatment of raw salmon with butylated hydroxytoluene may prevent belly burn throughout the period of icing when various preservatives are used. [USFDA has not approved furylformide and tylosine for use in human food.] [Abstracter M. M. Gwin]

3.15
(*)

IRRADIATION INDUCED GASES IN PACKAGED FOODS.
I - IDENTIFICATION AND MEASUREMENTS

Pratt, G. B., L. E. Kneeland (American Can Company, Research and Development Department, Barrington, Illinois 60010), and F. Heiligman and J. J. Killoran (U.S. Army Natick Laboratories, Natick, Massachusetts 01762)
Journal of Food Science 32, No. 2, 200-207 (March-April 1967)

If foods are packaged without sufficient headspace, the packages may swell after being irradiated. The primary cause of swelling is the evolution of hydrogen gas. Small amounts of other gases--such as CH₄, CO, and CO₂--may also be present in the packages. The amount of induced gas in model systems was found to vary directly with the irradiation doses and to vary to a lesser extent with the concentration of particular food components. Packaging materials of tinplate and glass had no effect on the type or quantity of gas produced. Packaging in a polyolefin plastic material resulted in a small increase in H₂. Temperature of the product during irradiation had a pronounced effect on production of gas; about half as much gas was produced by irradiation at temperatures below 0° C. as by irradiation above this temperature. A mathematical model for estimating the production of induced gases from proximate analysis was successful in predicting gas production in five food products. [13 references]

[Abstract of this article appears under 7.591 page 11 - August 1967]
[Abstract: M. M. Gwin]

4.29
(*)

PURIFICATION OF TRIGLYCERIDES WITH AN ALUMINA COLUMN

Jensen, R. G., T. A. Marks, J. Sampugna, J. G. Quinn, and D. L. Carpenter (Department of Animal Industries, University of Connecticut, Storrs)
Lipids 1, No. 6, 451-452 (November 1966)

When synthetic mixed acid triglycerides are prepared by acylating monoglycerides or diglycerides with the requisite fatty acid chloride, the acylation is sometimes incomplete and results in a mixture with many impurities. Purification of the acylation mixtures can be difficult and time consuming. Purification can be accomplished and the difficulties avoided by using a column of neutral alumina to remove impurities of diglycerides from preparations of synthetic triglycerides. Various types of alumina can be used for purification, and all work equally well. The technique will clean up large quantities of triglycerides with good recovery and without structural alterations. Use of an alumina column eliminates washing with dilute base to remove fatty acids and consequently eliminates the emulsions that often arise. The advantages of speed, good recovery, large column load, and absence of structural alterations suggest that this method may have widespread application. [Abstract: M. M. Gwin]

*Item on back of card.

8.59
(*)

A NEW SAPONIN, HOLOTHURIN B, ISOLATED FROM
SEA-CUCUMBER, HOLOTHURIA VAGABUNDA AND HOLOTHURIA LUBRICA

Yasumoto, Takeshi, Kiyoshi Nakamura, and Yoshiro Hashimoto (Laboratory of Marine Biochemistry, Faculty of Agriculture, University of Tokyo, Japan)
Agricultural and Biological Chemistry 31, No. 1, 7-10 (January 1967)

Two species of sea-cucumber (Holothuria vagabunda and H. lubrica) were found to contain an unknown saponin component, in addition to a major saponin component identical to holothurin A, which was isolated from Actinopyga eschscholtzii. The unknown component was isolated and labeled holothurin B. It contained D-quinovose, D-xylose, sulfuric acid as the sodium salt, and presumably the same aglycone content as holothurin A. Holothurin B, however, lacked the 3-O-methyl-D-glucose and D-glucose, which are present in holothurin A. [10 references]

[Abstract: M. M. Gwin]

*Items on back of card.

De, H. N., and Moshinul Haque (Pakistan Council Sci. Ind. Res., Dacca, Pakistan)
Chemical Abstracts 66, No. 5, 18115p (January 30, 1967)

BIOCHEMICAL AND NUTRITIONAL STUDIES ON EAST PAKISTAN FISH.
X - REDUCING SUGAR CONTENT OF SOME FRESH WATER FISH
AS INFLUENCED BY BOILING TREATMENT AND STORAGE
UNDER ROOM TEMPERATURE AND IN ICE

9.15
(*)

THE EFFECTS OF COOKING ON CHLORINATED HYDROCARBON
PESTICIDE RESIDUES IN CHICKEN TISSUES

Ritchey, S. J., R. W. Young, and E. O. Essary (Department of Human Nutrition and Foods, of Biochemistry and Nutrition, and of Poultry Science, Virginia Polytechnic Institute, Blacksburg, Virginia)
Journal of Food Science 32, No. 2, 238-240 (March-April 1967)

The concentration of pesticides in the carcasses of birds has received considerable attention. Recent efforts have concentrated on the determination of the level of pesticide residue after normal processing and cooking. Because foods are usually eaten after the processes of cleaning and cooking, there appeared to be a definite need to investigate the effects of these processes on commonly occurring residues. This report summarizes available information on the persistence of two pesticides in chicken tissues.

DDT (1,1,1-trichloro-2,2-bis (p-chlorophenyl) ethane) and lindane (1,2,3,4,5,6-hexachlorocyclohexane) were fed separately and in combination at levels of 0.2 and 2.0 p.p.m. to chickens for a period of 9 weeks. The pesticides that were incorporated into the tissues were considerably reduced when the birds were cooked by baking or frying. DDT, DDE (1,1-dichloro-2,2-bis (p-chlorophenyl) ethene), and Kelthane (4,4-dichloro- α -(trichloromethyl)-benzhydrol) were present in both the control and cooked carcasses; however, DDD (1,1-dichloro-2,2-bis(p-chlorophenyl) ethane) was found only in the cooked carcasses. A relation between DDT and lindane appeared likely in which lindane enhances the retention of DDT in the tissues. [10 references]

*Items on back of card.

4.29

AN IMPROVED MIXED ANHYDRIDE TECHNIQUE
FOR FATTY AMIDE SYNTHESIS

Applewhite, T. M., and Jane S. Binder (Western Regional Research Laboratory, Albany, California)
Journal of the American Oil Chemists' Society 44, No. 7, 423-424 (July 1967)

The classical method of synthesizing a series of amides from the hydroxy fatty acids of castor oil calls for the addition of an equimolar amount of an alkyl chlorocarbonate to a carboxylic acid salt in a cold inert solvent, then the addition of an appropriate amine. With the method, Schipper and Nichols (1958) obtained 16-83 percent yields of amides of keto and ketohydroxy fatty acids, with symmetrical anhydrides as byproducts. Since symmetrical anhydrides are only half as efficient for amide synthesis as mixed carboxylic-carbonic anhydrides are, the amide yields suggest that reaction and competitive reaction occur simultaneously. To test the thesis, the authors reversed the order of mixing the reactants and used excess alkyl chlorocarbonate in a technique they called "inverse addition."

Slowly adding a solution of amine salt of the carboxylic acid to a cold, stirred solution of the alkyl chlorocarbonate prevented an excess amount of carboxylate anion in the reaction mixture. Addition of sufficient amounts of amine to react with both the mixed anhydride and the excess chlorocarbonate improved both the yield (75-98 percent, crude yield) and the purity (by eliminating the byproducts) of the product.
 [Abstract: L. Baldwin]

3.15

POLAROGRAPHIC STUDY OF THE EFFECTS OF
OF γ -RADIATION ON CYTOSINE

Platicha-Lanský, R., and J. J. Weiss (School of Chemistry, University of Newcastle upon Tyne, England)
Analytical Biochemistry 16, No. 3, 510-522 (September 1966)

Polarographic studies of the effects of γ -radiation on cytosine showed that isobarbituric acid undergoes further radiation-induced reactions. A temporary yellow-green coloration and green fluorescence were attributed to the formation of 4,4'-disobarbituric acid. Further radiolytic products of isobarbituric acid were isodialuric and dialuric acids. The easy oxidation of dialuric acid leads to the formation of alloxan and then to dialuric acid + alloxan = alloxanthin.

Parabanic acid is formed when the radiation dose is increased, probably as an oxidative product of alloxanic acid formed by a benzoic acid type of rearrangement of alloxan. Parabanic acid undergoes hydrolysis, which gives rise to oxaluric acid.

With a radiation dose of above 5×10^{20} ev ml⁻¹, the overall effects are ring opening and hydrolytic formation of simple aliphatic compounds. The solution again turns colorless. [28 references]
 [Abstract: M. F. Tripple]

CHEMICAL AND PHYSICAL PROPERTIES OF OILS
 PRESERVATIVES, IRRADIATION

9.15

DECHLORINATION OF DDT BY AEROBACTER AEROGENES

Wedemeyer, Gary (Fish-Pesticide Research Laboratory, U.S. Fish and Wildlife Service, Denver, Colorado)
Science 152, 647 (April 29, 1966)

Dechlorination of DDT (1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane) to DDD (1,1-dichloro-2,2-bis(p-chlorophenyl)ethane) in higher animals requires molecular oxygen. In microorganisms, the presence of oxygen hinders dechlorination. In cell-free preparations of *Aerobacter aerogenes*, the use of selected metabolic inhibitors indicated that reduced Fe(II) cytochrome oxidase caused DDT dechlorination. This reaction could explain the persistence of DDT residues in soils and sediments.
 [Abstract: M. F. Tripple]

9.15

UPTAKE OF PLUTONIUM BY THE LOBSTER,
HOMARUS VULGARIS

Ward, Eileen E. (U.K. Atomic Energy Authority, Cumberland, England)
Chemical Abstracts 64, 16530f (May 23, 1966)

8.59

ISOLATION AND CHARACTERIZATION OF ENOLASE
FROM RAINBOW TROUT (SALMO GAIARDNERII GAIARDNERII)

Cory, Robert P., and Finn Wold
Biochemistry 5, No. 10, 3131-3137 (October 1966)

Enolase was purified and crystallized from the white skeletal muscle of rainbow trout (*Salmo gairdneri gairdneri*). This enzyme contained three electrophoretically distinct enolases. Since the same ratio of these three enzyme forms was present in the original muscle extract, it was concluded that the three forms were not artifacts of isolation. Using the mixture of the three forms, trout muscle enolase was characterized with respect to physical, chemical, and biochemical properties.

The crystalline enzyme was homogenous in the ultracentrifuge. It had a molecular weight of 91,000. In contrast to the enolases from yeast and rabbit, it contained both sulphydryl and disulfide groups. Its catalytic properties were quite similar to other enolases with respect to kinetic constants, to inhibition by fluoride, and to the absolute requirement for divalent metal ion. [19 references]
 [Abstract: M. F. Tripple]

Mettick, D. F., and J. M. Telford (Univ. West Indies, Kingston, Jamaica)
Chemical Abstracts 64, 7092e (February 28, 1966)

THE HISTAMINE CONTENT AND HISTIDINE DECARBOXYLASE ACTIVITY
 OF SOME MARINE AND TERRESTRIAL ANIMALS
 FROM THE WEST INDIES

DISEASES AND POISONS OF FISH
 ORGANIC COMPOSITION

<div data-bbox="153 2414 175 2459" data-label="Text">0.6</div> <div data-bbox="153 1559 175 2202" data-label="Section-Header">A PROCESS FOR IMPROVING ANIMAL OR FISH PRODUCTS</div> <div data-bbox="205 1343 282 2446" data-label="Text"> <p>British Patent 1,045,046 Abstracts from Current Scientific and Technical Literature 19, Abstract No. 2909, p. 547 (December 1966)</p> </div> <div data-bbox="310 1330 415 2446" data-label="Text"> <p>The flavor of fish can be improved by incorporating a 5'nucleotide(s) or its salt and phosphoric acid, citric acid, succinic acid, fumaric acid, tartaric acid, maleic acid, or thiodipropionic acid (or the salt of one or more of these acids) into the ground meat and then heating it.</p> </div> <div data-bbox="624 1323 752 2446" data-label="Text"> <p>Research done from 1926 to the present on the specific and latent heats of solidification of foodstuffs is reviewed and basic theories concerning cold storage and freezing applications are discussed. Detailed descriptions of the research methods and materials are given. [14 references plus a bibliography.] [Abstracter: M. F. Triplett]</p> </div> <div data-bbox="857 1285 879 2285" data-label="Section-Header">0.6 SPECIFIC AND LATENT HEAT OF FOODS IN THE FREEZING ZONE</div> <div data-bbox="778 1323 827 1935" data-label="Text"> <p>Woolrich, W. R. (University of Texas, Austin) ASHRAE Journal 8, 43-47 (April 1966)</p> </div>	<div data-bbox="153 1136 175 1217" data-label="Text">2.1121</div> <div data-bbox="153 652 175 957" data-label="Section-Header">RESISTANCE OF TRAWLNET</div> <div data-bbox="205 78 282 1207" data-label="Text"> <p>Koyama, Takeo (Takai Reg. Fish. Res. Lab., Kachidoki, Chuo-ku, Tokyo, Japan) Bulletin of the Japanese Society of Scientific Fisheries 33, No. 2, 74-80 (February 1967)</p> </div> <div data-bbox="310 57 415 1207" data-label="Text"> <p>Ten types of trawling gear were used by six stern trawlers, ranging from 100 to 3,000 gross tonnage, during studies on the hydraulic resistance of fishing gear. Net resistance was estimated theoretically by subtracting the resistances of other board, warps, and hand rope from the total resistance of the gear.</p> </div> <div data-bbox="443 214 465 1136" data-label="Text"> <p>The resistance (R) of a six-seam trawl net is expressed as follows:</p> </div> <div data-bbox="465 78 609 1207" data-label="Equation-Block"> $R = kab \frac{d}{l} v^2, \text{ where } a = \text{maximum breadth of net body without shrinkage (in meters);}$ $b = \text{maximum length of trawl net without shrinkage (in meters); } d = \text{diameter of net twine, } l = \text{length of each mesh bar at side panel, and } d/l = \text{average value of the ratio; } k = \text{resistance coefficient; and } v = \text{towing speed in meters per second.}$ <p>[Abstracter: M. M. Gwin]</p> </div>	<div data-bbox="936 2368 959 2451" data-label="Text">1.01046</div> <div data-bbox="933 1534 955 2197" data-label="Section-Header">WFA [WHITE FISH AUTHORITY] TEST NEW PRAWN GROUNDS</div> <div data-bbox="986 1315 1034 2439" data-label="Text"> <p>Anonymous World Fishing 16, No. 2, 53-54 (February 1967)</p> </div> <div data-bbox="1060 1315 1267 2439" data-label="Text"> <p>The British White Fish Authority conducted a study of a possible new shrimp fishery off the west coast of Scotland because fishermen in the area have reported what they call "pink shrimp" in their catches during the past 2 years. The Authority chartered a 55-foot prawn trawler to conduct trials using trawls of both Swedish and Danish design. These trawls are used by Scandinavian fishermen to fish for <u>Pandalus borealis</u>. The Danish trawl is designed to hug the bottom; the Swedish trawl is virtually a herring trawl and has a higher action than the Danish net has.</p> </div> <div data-bbox="1291 1315 1445 2439" data-label="Text"> <p>The Authority found that the shrimp were not <u>Pandalus borealis</u>, but were <u>Pandalus bonnier</u>, which is a slightly different species. The commercial possibilities for <u>P. bonnier</u> are reported to be good. The best single catch was 56 pounds of <u>P. bonnier</u> and 42 pounds of <u>Nephrops</u>. The full extent of the fishery was not established because poor weather stopped the trials, but the Authority believes that a commercially exploitable fishery exists.</p> </div> <div data-bbox="1471 1323 1574 2439" data-label="Text"> <p>Research on the behavior of <u>P. bonnier</u> is necessary to develop efficient methods of catching it. The quantities caught were insufficient to support a vessel if <u>P. bonnier</u> were the vessel's entire catch; however, the <u>Nephrops</u> caught with them could make a dual fishery profitable. [Abstracter: E. R. Weissman]</p> </div>	<div data-bbox="912 1141 935 1209" data-label="Text">2.117</div> <div data-bbox="912 458 935 965" data-label="Section-Header">DEVELOPMENT OF INSHORE STERN TRAWLERS</div> <div data-bbox="964 309 1014 1199" data-label="Text"> <p>Noel, H. S. Australian Fisheries Newsletter 25, No. 12, 24-26 (December 1966)</p> </div> <div data-bbox="1040 83 1169 1199" data-label="Text"> <p>The development of inshore stern trawlers is discussed, and several boats of this type are briefly described to illustrate the points discussed. The major developments have been in the direction of improving methods and gear, which have led to greater hauls and longer fishing trips. Several arrangements for hauling gear are briefly described. [Abstracter: E. R. Weissman]</p> </div> <div data-bbox="1417 68 1441 1136" data-label="Text"> <p>Detailed descriptions are given of four new British freezer stern trawlers. The ships incorporate a number of unconventional design features, such as the use of twin hatches. [Abstracter: E. R. Weissman]</p> </div> <div data-bbox="1522 68 1546 733" data-label="Text"> <p>Anonymous World Fishing 15, No. 8, 49-51, 56 (August 1966)</p> </div> <div data-bbox="1602 309 1624 844" data-label="Section-Header">FOUR NEW BRITISH FREEZER STERN TRAWLERS</div> <div data-bbox="1607 57 1629 131" data-label="Text">2.117</div>	<div data-bbox="1677 2157 1700 2358" data-label="Section-Header">FOOD TECHNOLOGY</div> <div data-bbox="1731 1942 1753 2358" data-label="Section-Header">FISHERIES OF THE UNITED KINGDOM</div> <div data-bbox="1685 962 1707 1123" data-label="Section-Header">FISHING GEAR</div> <div data-bbox="1735 922 1757 1123" data-label="Section-Header">FISHING VESSELS</div>
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[illegible]

<p>2.1475</p> <p>DAILY CATCH OF DANISH SEINERS BY THE SAME NUMBER OF DAILY HAULS AT THE SAME DEPTH ZONE IN THE BERING SEA</p> <p>Maéda, Hiroshi, and Shiro Minami Bulletin of the Japanese Society of Scientific Fisheries 32, 511-516 (June 1966)</p> <p>The daily catches of 22 Danish seiners belonging to one of the Japanese fish-meal fleets that operated in the Bering Sea in 1963 were studied. Records were kept of the daily catch of each boat according to area, depth, and grade of daily haul. The results include the following.</p> <p>The frequency distribution of daily catch per boat agreed, for the most part, with expected frequency distributions. The daily catch per boat increased with depth, contrasted with the daily haul per boat, which decreased with depth. The bathymetric differences of daily hauls made collecting good data for the daily catch yielded by the same grade of daily haul difficult. In equivalent depth zones, the daily catch per boat was poorer on days when the boats conducted frequent hauling than it was on days when the boats conducted less frequent hauling; moreover, the daily haul for a given boat decreased with the increase in the daily catch for that boat.</p> <p>These findings and the deviation of the daily hauls made in a given depth zone suggest the necessity of stratifying the records according to the grade of daily haul.</p> <p>[Abstractor: M. F. Tripple]</p>	<p>3.338</p> <p>EXPERIENCES WITH ALUMINUM FOR CANNING AGGRESSIVE FISH PRODUCTS</p> <p>Jensen, A. Corros. Tech. 12, No. 6, 26-28 (1965) World Fisheries Abstracts 17, No. 1, 35 (January-March 1966)</p> <p>Recent experience in Denmark with packing chemically active food products in aluminum cans drawn from prelacquered strip is described. The results of shelf-life tests carried out in Norway are compared. The cans were measured and placed in incubators at 22° and at 37° C.; the deflection values were measured at regular intervals. Graphs show the deflection values plotted against storage time for herring fillets in tomato, mustard, and curry sauces. Results indicate that anodized and lacquered aluminum can be advantageously used for various products that, up to this time in Norway, have not been commercially packed in this material.</p> <p>[Extractor: G. K. Chandler]</p>
<p>3.249</p> <p>STORAGE OF FREEZE-DRIED FOODS. IV - CHANGES OF COLOR AND FAT DURING STORAGE OF OYSTERS HARVESTED AT VARIOUS SEASONS</p> <p>Yamasaki, Hiroshi, Mitsuo Sunagawa, and Hiroshi Imai (Food Ind. Exptl. Sta., Hiroshima, Japan) Chemical Abstracts 66, No. 25, 114710z (June 19, 1967)</p> <p>[Abstractor: L. Baldwin]</p> <p>During storage, volatile carbonyls in frozen halibut increase. The effect of these carbonyls on the changes that occur during storage was unknown to the authors, yet they noted that identification would be worthwhile.</p> <p>They obtained 2,4-dinitrophenylhydrazones of volatile monocarbonyls from the water homogenate and the n-hexane extracts of halibut meat. Analysis of the hydrazones revealed that ethanal was the main carbonyl in the water homogenate and that propanone, butanone, pentan-2-one, and hexan-2-one were present in the n-hexane extracts. Another hydrazone with an ultraviolet absorption similar to that of alkanone was isolated but not identified. Several n-alkanals, including methanal, ethanal, and n-nonanal, were also detected.</p>	<p>9.14</p> <p>PHYSIOLOGY OF DIGESTION IN <u>TILAPIA MOSSAMBICA</u>: DIGESTIVE ENZYMES AND THE EFFECTS OF DIETS ON THEIR ACTIVITY</p> <p>Nagase, Goro (Univ. of Hawaii, Honolulu, Hawaii) Chemical Abstracts 64, 3996c (January 31, 1966)</p> <p>[Abstractor: E. R. Weissman]</p> <p>Rainbow trout were fed two types of oxidized oils, with and without an ethoxyquin supplement. One of the oils was a highly peroxidized cod-liver oil; the other was a peroxidized-decomposed oil prepared by heating cod-liver oil. Without the supplement, both the highly peroxidized cod-liver oil and the peroxide-decomposed cod-liver oil produced a death rate of 70 percent in the trout. With the ethoxyquin supplement, the death rate was about 24 percent. The lipid content of the internal organs was higher in the trout fed the oxidized oils without ethoxyquin supplement than in those fed the same oils with the supplement. Oxidized lipids appeared in the organs of fish fed oils without supplementation; oxidized lipids did not appear in the organs of fish fed the supplemented diet.</p>
<p>3.243</p> <p>VOLATILE MONOCARBONYLS IN FROZEN HALIBUT</p> <p>Matsuto, Shigeki (Tokai University, Women's College, Miyamaecho, Shizuoka, Japan), Fumio Nagayama (Tokyo University of Fisheries, Minato-ku, Tokyo, Japan), and Toyoki Ono (Department of Agricultural Chemistry, Nihon University, Setagaya-ku, Tokyo, Japan) Bulletin of the Japanese Society of Scientific Fisheries 33, No. 6, 586-590 (June 1967) (In Japanese, English summary)</p>	<p>3.338</p> <p>CHROMIUM-PLATED AND LACQUERED SHEET STEEL--A NEW MATERIAL FOR PRESERVED FOOD CANS</p> <p>Mytsik, P. A., V. M. Semlin, and V. T. Stepanenko Chemical Abstracts 65, 17605d (November 21, 1966)</p> <p>Effects of oxidized fish oils and added ethoxyquin on the culture of rainbow trout</p> <p>Honjoh, Tetsuo (Gifu Prefecture Fisheries Station, Gifu, Japan), and Hisashi Kumazawa, Masakatsu Oosaki, Takeshi Yonemura, and Genzoh Kashiwa (Yoshikawa Oil and Fat Co., Research and Development Division, Mamaharashinden, Komaki, Japan) Journal of Japan Oil Chemists' Society 16, No. 3, 135-137 (March 1967)</p>

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New material for food cans	27	3.338	Plastic cutting boards for deboning	8	2.3
Canning chemically active fish products	27	3.338	Motor-operated skinning knife (Brit. Pat. 1,047,168)	21	2.3
			Motor-operated skinning knife (Brit. Pat. 1,046,945)	21	2.3
			Electrohydraulic treatment for sterilization	22	2.3
			Treatment of fish processing wastes	22	2.3
Chemistry and biochemistry, miscellaneous					
Effect of water binders on lipase activity	1	0.38	Marine plant products		
Glucose-6-phosphate dehydrogenase in the oyster	1	0.38	Alga as food	13	6.37
Protein binding of fatty acids	1	0.39	Alga meal in poultry feed (US Pat. 3,257,210)	14	6.37
Reaction of malonaldehyde with protein	1	0.33	Food with alginates and carrageenates (French Pat. 1,428,823)	14	6.37
Enzymic reactions in dried foods	2	0.38	Effect of processing on microflora of seaweed meal	15	6.37
Enzymic retardation of browning	2	0.38			
Fish lactate dehydrogenase	2	0.38	Marketing		
Glutamic-oxalacetic transaminase in two fresh-water fish	2	0.38	Consumer measurement and attitude scales	7	2.6
Mechanism of oxidative phosphorylation	2	0.39			
Degradation of nucleotides in prawn and carp	3	2.02			
Degradation of nucleotides in scallop and abalone	3	2.02			
Degradation of nucleotides in squid	3	2.02			
Swelling and blackening of canned baby clams	11	3.3342			
Fractionation of subcellular particles	21	0.35	Oils, chemical and physical properties		
Membrane structure and ion permeation	21	0.35	Cholesterol distribution in fish	12	4.13
Organic oxidation mechanisms	21	0.30	Catalysts in olefin hydrogenation	13	4.22
Circular dichroism of biological macromolecules	22	0.35	Copolymerization of fatty acids	13	4.29
Degradation of tritiated glycyl ether	22	0.35	Hydrogenation of whale blubber	14	4.22
Lipid peroxidation damage to biological materials	22	0.35	Methanolysis of sperm whale oil	14	4.29
Tetramethylene-interruption of fatty acid double bonds	22	0.30	Preventing methanolysis of waxes in whale oil	14	4.29
			Purification of triglycerides	23	4.29
			Synthesizing amides from fatty acid	24	4.29

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